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Output of Coke Oven By-Products

THE By-Product Coking Industry, although essentially existing for the purpose of supplying coke, is nevertheless an important branch of the chemical industry. The presidential address by Mr. G. W. J. Bradley at the annual meeting of the Coke Oven Managers' Association was an outspoken discussion of the problems of the industry, and as such contained certain issues which may well be of interest to other branches of the chemical industry. The address draws attention to the interest shown by chemical manufacturers in the subject of trade associations, and shows that even now the coke oven industry is groping its way towards something of the same character.

It is evident that technical skill and technical progress in most industries are only half the battle. There are some chemicals so difficult to manufacture commercially and so specialised that their production receives the greatest consideration and care, and marketing is completely or relatively insignificant. Several of the rarer drugs and the radio-active substances would presumably come in this category. There are other products, such as sulphuric acid and sulphate of ammonia, in which the manufacturing processes are well understood and the success of the industry is governed rather by the marketing organisation than by the skill of the chemist and engineer. It is evident from Mr. Bradley's paper that the coke oven industry is to be numbered amongst this last-mentioned group.

The number of coke ovens to be erected throughout the country is governed only by the availability of capital, and the possibility of marketing the prime product. Since capital is still relatively plentiful, it can be assumed that marketing difficulties present the sole bar to further expansion. The coke oven industry is unlike most chemical industries in that its main product is not chemical, and its by-products provide its principal title to the generic name "Chemical." Upon the sale of the coke depends the future of the industry, and it is in that direction that the coke oven owners and managers are endeavouring to formulate comprehensive schemes for increasing the public appetite for coke and for keeping the price at a reasonable figure.

Into this particular problem of the industry, important as it is, we need not go, but it is interesting to notice that whereas adequate marketing arrangements, and in some instances trade associations, have been formed long ago to deal with sulphate of ammonia, benzole, tar products, and the like, the sale of the main product has been left more or less to chance. One of the most important deductions to be made is that since there is the possibility (to put it no higher) that the number of coke ovens at work in this country may increase threefold within the next 20 years if adequate marketing arrangements can be set up and maintained, the quantity of sulphate of ammonia, tar, benzole, and gas will increase proportionately. That is important because it affects all the industries which use these materials, and it may affect also the synthetic ammonia industry. There will be no difficulty in disposing of the increased make of benzole, but sulphate of ammonia and tar products may prove to be more difficult.

Undoubtedly a part of the way out, so far as tar products are concerned, may be by the hydrogenation of the lower boiling constituents, but, as a Fuel Research Board Paper recently published has shown, there is little hope of hydrogenating pitch successfully. When this expansion occurs the ability of whatever marketing organisations may exist to dispose of the much larger quantities of some of these products which must be produced willy-nilly will be severely taxed, and the possibility of a fall in the price of these products must be envisaged by those who are working for the expansion of the industry on the coke side.

Gas has been mentioned among the by-products of the coking industry, and this in itself provides both an opportunity for the chemist, and a source of difficulty. It is painful in 1937, and it will be unthinkable twenty years hence, that we should carbonise coal to produce coke, tar, ammonia and benzole, and be content to waste the gas. Mr. Bradley foresees this problem, and deplores that the developments in separation of the constituents of the gases by cooling at very low temperatures, which is practised abroad, has not been introduced into this country. He believes that the balancing of coke and gas production to suit consumption will become a pressing problem, and to avoid wastage, some cheap and reliable method is required for converting varying quantities of surplus gas into products which can be stored in small bulk. The main difficulty in the way of bringing this about is that sufficiently large units are needed to be economic, and here again is a call for co-operation. Matters of policy regarding petroleum, hydrogenated products, methanol and so on are considerations, but the resources of the country are involved in the waste of gas which goes on now and which will be greatly extended if the industry expands farther. Numerous patents have been published which protect various processes invented for the conversion of these gases into useful chemical products. Many of these processes have not been worked on a commercial scale, but should a large surplusage of waste gas arise, they might well find extended commercial application.

Notes and Comments

Political Interference with Trade

WHEN will the politicians cease interfering with our trade and commerce? This vice is not confined to one party, as two recent examples show. Mr. Stanley announces that he is working to secure an Anglo-American trade treaty. His position is promptly queered by some of the normal supporters of the Government, who, fearful of putting the Ottawa Agreements in the slightest jeopardy, completely fail to see that an expansion of international trade in one direction is bound to stimulate it in every other. The House of Commons next presents us with the astounding spectacle of a whole party voting against the Government for taking a modest step towards regaining some of our lost trade in Spain. A prominent Opposition leader goes so far as to suggest that South Wales miners would rather remain on the dole than ship bigger cargoes of coal to territory under General Franco's control. There are, fortunately, signs of a revolt in the constituencies against the absorption of their representatives in international bickering, to the detriment of their primary duty to keep the home fires burning. The high standard of living at present enjoyed in Great Britain is the result of what still is the freest system of trading in the world, and to allow political predilections to add more fetters to those already existing is to ask for even worse trouble than befell this country in 1931.

Stabilisation of Steel Prices

WITHIN the last eighteen months, the price of steel has increased by about 30 per cent. An increase announced in May, 1936, amounted to 10 per cent. and a further rise of from 17 to 25 per cent. took place in May of this year. These big advances were not merely due to greatly increased demand, with resultant shortage, but also to the large increases in the prices of the main raw materials, coke and iron ore. The British Iron and Steel Federation has now announced that the prices of the main basic steel products will be maintained at their present level until the end of 1938. It is stated that there is no abatement of the demand for steel products, and in taking this course in the face of increased and still increasing costs of raw materials, the iron and steel industry is actuated by the desire to contribute to the prolongation of the present level of trade activity and by the hope that some mitigation of the burden of its own material costs may be secured by co-operation with the interests involved. It is a matter, therefore, of taking smaller profits now to maintain a healthy market should the present demand fall off. Its success depends on similar action being taken by the suppliers of raw materials. The Federation's decision will be wholeheartedly welcomed by steel users, who are thus able to make forward contracts without fear of loss due to rising prices.

The Special Areas

ON Tuesday, Mr. C. H. Boyd presented to a meeting of the Institution of Chemical Engineers an account of the work of the Commissioner for the Special Areas; an account which was remarkable for showing in a short space the very wide scope of the Commissioner's activities. It was obvious that the problem of the special areas was being tackled in a whole-hearted and enthusiastic manner, but the work cannot be crowned with success unless the industrialist does his share—by the setting up of permanent industries in those areas. He is encouraged by the Commissioner through the establishment of trading estate companies and through financial assistance. In the discussion which followed this interesting paper, it was commented that the facilities offered by the trading estate companies were not brought to the notice of the industrialist sufficiently. It was suggested that home manufacturers of products which are imported to a great extent into this country, might be circulated and their attention drawn to the special areas. Factories thus established would be of benefit not only to the area but to a more favourable balance between imports and exports. Colonel Appleyard emphasised that the labour available in the areas was better than in most parts of the country. He wished to correct the general misconception that it was highly unskilled. The whole problem is associated with that of the location of industry; it was pointed out that if rates of power and transport could be equalised all over the country, a cause which drags people to any one area would be removed.

Trade Development

FAILURE of many businesses can be put down to lack of progress on both the commercial and technical sides. A business which is not constantly striving to improve itself but is content to remain stationary will inevitably, sooner or later, be killed by more progressive competitors. This is true of industrial businesses and it can also be true of the class of trade as a whole to which that individual business belongs. Thus, just as a business may develop through research directed towards the improvement of its manufactures and the introduction of new products, so trade research organisations can tackle problems of the same nature on a far broader basis, whereby the trade concerned is strengthened against foreign competition. An important step in this direction has been taken by the British Cast Iron Research Association. Lord Dudley announced at the annual luncheon of the Association that a £40,000 research scheme had been established. He said that we could not afford to see countries spend more and more money in doing research, which we could do better, but which we could not afford because of the *laissez faire* attitude adopted.

Industrial Architecture

AT some time or another every company has had to face the truly appalling task of planning out, and having erected, a new factory or extension to existing premises. It is a time of seemingly endless negotiations with architects and builders. In his presidential address to the Architectural Association, Mr. L. H. Bucknell made a point that demonstrates a cause of friction in negotiations between the industrialist and the architect. He said that many industrialists simply say, "you put up the building, we will give you the floor sizes and heights, etc., and then we will fit in our machinery." To Mr. Bucknell's mind this is putting the cart before the horse. In these circumstances the architect is almost certain to produce a shell without convenience, economy, or of real architectural quality. An architect takes the view that the factory is not a building in which machinery is installed, but a building which grows from the necessity and form of the plant and machinery. That being the case the architect, to do his job well, must have a full measure of co-operation from the employer.

Synthetic Organic Compounds in the Textile Industry

By
G. S. RANSHAW

DURING the past few years the large-scale manufacture of a large number of synthetic organic chemicals has been undertaken, and the properties of many of these are such that they could be well used in many textile processes, either as improvements on older methods, or for producing entirely new effects. The barrier to progress in this respect has generally been the question of price, and several substances with properties very interesting from a textile point of view have lacked attention. A number have been taken up with success, however, where their large-scale use in other branches of industry has been reflected in decreased cost; these are primarily of the synthetic solvent type and are being used for solubilising and dispersing dyestuffs and pigments for imparting a soft finish to rayon, and as yarn lubricants.

Some Solvents obtained by Hydrogenation

The most commonly used solvent in the textile industry is probably tetraline, or tetrahydronaphthalene, a colourless liquid with a high boiling point (206-7°) and specific gravity 0.975. Obtained by the catalytic hydrogenation of purified naphthalene, its cheapness, slow rate of evaporation, and high solvent power have long favoured its use in industry generally. In the textile trade, although it has for some time been used as a solvent pure and simple (as a constituent of certain "solvent soaps" and special sulphonated oils) it is being incorporated with success in some kier-boiling assistants, since it exercises a mild bleaching action without the danger of oxycellulose formation.

Its homologue, decaline, obtained by the complete hydrogenation of naphthalene, is similarly employed, but owing to the fact that it has no swelling action on acetate rayon and assists in the dispersion of insoluble colouring matters, it is also used in dyeing this fibre.

Cyclohexanol, and its derivative, methycyclohexanol, are prepared by the catalytic hydrogenation of phenol and cresol respectively. Cyclohexanol is a neutral, colourless liquid with B.P. 160° and density 0.945. It is a good solvent for fats, oils and waxes, but its chief textile use is owing to the fact that it dissolves completely in soap solutions or in textile assistants of the sulphonated oil, sulphonated fatty alcohol or alkyl naphthalene sulphonic acid type, increasing their wetting power and detergent properties while remaining stable to acids and the hardness-forming elements of water.

A derivative of cyclohexanol, namely, the stearate $C_6H_{11}.CO.C_{17}H_{35}$ is coming to the fore in textile finishing. It is a white, practically odourless wax, melting at 25° to a pale yellow liquid. It is very stable to acids and alkalis, and makes an excellent soft finishing agent for rayon. It has been applied with success to viscose, mercerised cotton and natural silk hosiery yarns for this purpose. It compares very favourably with the sulphonated oil, fatty alcohol and oil emulsion type of softener, on account of its stability, lack of odour, good lubricating power and lack of any tendency to go rancid.

Diacetone alcohol $(CH_3)_2.C(OH)CH_2.CO.CH_3$, is a fair solvent, but it possesses considerable dispersing power, and is thus particularly suitable for the preparation of printing pastes. It is a colourless liquid with a very slight odour, boiling at 160 to 170° and having density 0.941. It is decomposed by alkalis and by acids (above 100°). In the textile trade it is applied for the preparation of printing pastes with basic, acid, direct and chrome colours: it is also a solvent for these dyes.

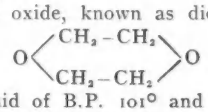
Ethylene glycol, $CH_2.OH-CH_2.OH$, is an oily liquid of B.P. 197° and practically odourless. Obtained by the action of chlorine or hypochlorous acid on ethylene and hydrolysis of the resulting intermediate product, it is soluble in water in all proportions. It has been found useful especially for dissolving the colours used in silk dyeing and printing, possessing a superior solubilising power to the glycerine, phenol, resorcin, aniline, etc,, usually used, and owing to its neutral reaction it can be used in alkaline printing pastes and for colour discharges on cotton and wool. It has also found a use as softening agent where glycerine has previously been used.

Diethylene glycol, $CH_2.OH-CH_2.O.CH_2.CH_2OH$, is obtained by the action of glycol on ethylene oxide. It is a colourless, odourless liquid of B.P. 244° and density 1.1175. It is soluble in water, but not in solvents such as benzene or carbon tetrachloride. Its solvent power is superior to that of ethylene glycol and it is widely used, at least in the United States, as a lubricant for cotton, wool, silk and rayon yarns. In finishing it is used as a softener for rayon, either alone or as an emulsion. It is also an excellent solvent for basic and vat colours and can be applied both in dyeing and printing.

Ethylene glycol monoethyl ether, $CH_2.OH-CH_2.O.C_2H_5$ is fairly widely known in other industries as "Cellosolve" and is capable of many textile uses. It has a B.P. of 134—6° and a density of 0.937. It is principally used for pasting dyestuffs, since it increases the solubility of basic, acid, vat or chrome colours. The result of the finer dispersion of these dyestuffs, of course, is increased penetration (hence greater fastness, bright colours and greater economy, since there is less loosely adhering dyestuff to be washed off eventually during laundering processes). There are patents, moreover, covering its use in dyebaths for this purpose. It is specially recommended for use with the indigo dyes, a small quantity being able to increase the solubility of the indigo "white" and so giving faster and deeper shades.

Diethylene glycol monoethyl ether, $HO.CH_2.CH_2.O.CH_2.CH_2.O.C_2H_5$, generally known in the chemical trade as "Carbitol," is a very hygroscopic liquid, boiling at 200 and having a density of 1.020. It has applications similar to those specified for "Cellosolve," constituting a solvent for dyestuffs in basic printing as a substitute for glycerine or acetin. Used in the ordinary dyebath it improves penetration, with its concurrent advantages.

1 – 4 Diethylene oxide, known as dioxane or "oxine,"



is a colourless liquid of B.P. 101° and density 1.037. Its textile uses are as yet few, but it has been proposed as a basis for assistants for wetting out fabrics previous to dyeing owing to its surface active properties. A patent of the I.G. Farbenindustrie covers a use in raw wool scouring together with soap and ammonia.

The Ethanolamines

Three associated organic compounds which are coming rapidly to the fore in textile processing are the ethanolamines. Triethanolamine is the most important, and is a viscous, colourless liquid with a faint ammoniacal odour. It is very hygroscopic and has a B.P. of 277° with a density of 1,120 at 15° C. It has been found to be an excellent emulsifier for fatty bodies and for paraffin. It combines with free fatty acids in molecular proportions and forms soaps, sometimes known as "aminated" soaps. These have a *p*H of about 8 and thus exert no deleterious effect on textile fibres. The oleate soap is a semi-liquid, completely soluble in water, and exhibits marked surface-active and detergent properties. The ethanolamines are good emulsifiers of mineral oils and may be used to produce textile yarn lubricants in the form of "soluble" oils. This application has been adopted by the knitters. They can be used as wetting agents or as scouring agents for raw wool in conjunction with soap. A stable emulsion is given by mixing 85 per cent. ethylene dichloride, 10 per cent. oleic acid and 5 per cent. triethanolamine with an equal volume of water.

Adulteration of Food and Drugs

Features of the Birmingham City Analyst's Report

ACCORDING to the annual report of the Birmingham City Analyst for 1936, 6,491 samples were submitted for analysis during the year, and of these 5,472 were taken in connection with the Sale of Food and Drugs Acts; of these samples 224 (or 4.0 per cent.) were found to be adulterated. This may be compared with the percentage of adulteration for all samples of foods and drugs taken in England and Wales, which in 1935 (the last year for which figures are available) was 5.5 per cent.

Phosphatase Tests on Pasteurised Milk

During the year a number of samples of pasteurised milk were examined for the Public Health Department by the so-called "phosphatase test." This test was introduced in 1935 by Kay and Graham and depends upon the detection of an enzyme known as phosphatase which is invariably present in raw milk, but is destroyed at the temperature of 145° F. which is the minimum temperature required for efficient pasteurisation. If phosphatase is found to be present in the sample the deduction is made that either the milk has been insufficiently heated or that raw milk is present, while the absence of phosphatase proves that the heating has been adequate.

The test is based on the fact that when milk containing phosphatase is incubated with disodium phenyl-phosphate, free phenol is liberated. The amount formed is an approximate measure of the phosphatase present in the milk, and may be determined by a colorimetric test. By this test it is possible quite easily to detect the presence of 0.5 per cent. of raw milk in pasteurised milk, and in some cases as little as 0.2 per cent. It will also detect the use of too low a temperature in the pasteurising process or the use of a period less than the statutory 30 minutes at the correct temperature.

Two samples of ammoniated tincture of quinine (out of eleven) were reported against. According to the British Pharmacopœia the tincture should contain 2 per cent. of quinine sulphate with an allowance of 5 per cent. in excess or deficit and 1 per cent. of ammonia with similar small allowances. One of the irregular samples contained 2.3 per cent. of quinine sulphate, an excess of 15 per cent. The retailer from whom this sample was bought obtained his supplies from a well-known London firm of manufacturing chemists and in a communication received from them it was admitted that the quinine content was unduly high. The explanation they offered was that owing to the warmer weather prevailing at the time the quinine sulphate used in preparing the tincture, which had been in stock for two months, had lost water of crystallisation by efflorescence, so increasing the proportion of quinine contained in it.

Losses Due to Evaporation

This explanation was most likely the correct one for it is a fact that crystallised quinine sulphate which originally contains $7\frac{1}{2}$ molecules of water of crystallisation, or about 15.3 per cent., is apt to lose such water on exposure to a dry atmosphere until it contains 2 molecules only or 4.6 per cent. Although this fact is recognised in the B.P., the article is required to contain an amount of water equivalent to 11-16 per cent. of the total weight and the onus is on the manufacturer to see that this provision is adhered to and to be careful that stocks are kept under suitable conditions.

The second sample contained the correct amount of quinine, but only 0.78 per cent. of ammonia, a deficiency of 22 per cent. The vendor having made an analysis of the contents of his stock bottle agreed that there was a deficiency of approximately this amount and alleged that the solution had originally been correctly made up, but that frequent removal of the stopper of the bottle, together with the high temperature of the shop were undoubtedly the causes of the deficiency.

Of nine samples of essence of peppermint two were incorrectly compounded. According to the B.P. this essence should consist of a 10 per cent. solution of oil of peppermint in 90 per cent. ethyl alcohol. One of the irregular samples contained the correct amount of oil, but isopropyl alcohol was used as the solvent in place of ethyl alcohol. Isopropyl alcohol can be bought at a fraction of the cost of ethyl alcohol, owing to the fact that it is not dutiable, and the sample was in fact sold at 1s. per oz. as compared with 1s. 6d. to 1s. 10d. per oz. charged at the other shops on the same day for the genuine article. The chief chemist of the firm responsible for the sale declared that the supply of the isopropyl mixture in place of the B.P. article could not be verified on account of the large trade done at the shop, but stated that assistants in all this firm's branch shops had strict instructions to explain the difference between the two articles to customers who were not clear as to which they required, to label the essence sold in accordance with its nature, and in addition to give verbal notice if the cheaper article was supplied.

The other sample was also made up with isopropyl alcohol and, in addition, 12 per cent. of oil of peppermint was present instead of 10 per cent. as is required by the B.P. The explanation given in this case was that the cheaper article had been supplied, during the chemist's temporary absence, by his wife who thought that the customer would not be prepared to pay 4s. for 2 oz. of the B.P. spirit. Unfortunately she omitted to use the slip label explaining the non-official character of the essence which he and his assistants invariably supplied in such cases.

Light Metal Alloys

Substitutes for Copper and Brass

THE applications of aluminium and its alloys in various branches of industry were reviewed by Dr. C. H. Desch, F.R.S., superintendent of the Metallurgical Department, National Physical Laboratory, in a paper read at a meeting of the Society of Chemical Industry at the Royal Technical College, Glasgow, on November 5.

Dr. Desch said that of the three important light metals—aluminium, magnesium, and beryllium—only the first two had been successfully used as the basis of light alloys. The use of aluminium alloys was greatly on the increase, lightness and excellent mechanical properties making them very advantageous. In Germany the replacement of imported metals like copper, tin, and nickel, by home products, had led to the substitution of aluminium for copper and brass, for tinplate, and even for stainless steel. Pure aluminium had the highest resistance to chemical action, and in sheet form it could be readily welded. Alloys of high strength were covered with a surface layer of the pure metal to obtain a combination of the necessary properties. Certain alloys of aluminium and silicon also had excellent chemical resistance to various reagents, and were used in both cast and wrought forms.

Light metal alloys fell into several groups. Some were used in a cast or annealed condition, owing their strength to elements in solid solution or to the presence of rigid skeletons of a second phase: others were brought into a homogenous condition by quenching from the solid solution region and then "age hardened" either at atmospheric temperature or by heating to a temperature below that of quenching. Alloys consisting mainly of magnesium were of value in aircraft construction, but were not likely to find wide application in chemical plant at present. Alloys of aluminium with 5 to 10 per cent. of magnesium, with or without the addition of other metals, had a surprisingly high resistance to chlorides.

Pigments for Rubber

AT a joint meeting of the London and District section of the Institution of the Rubber Industry and of the Oil and Colour Chemists' Association, held at the Royal Empire Society, Northumberland Avenue, London, on Monday, papers were presented on Dye, Lake and Mineral Pigments for Rubber. Mr. T. R. Dawson (chairman of the London and District Section of the Institution of the Rubber Industry) presided.

Dye and Lake Pigments

After a reference to the early literature on the subject of dye and lake pigments, Mr. H. Jones, B.Sc., said that during the last ten years many efforts had been made to introduce colours to the rubber trade and there was little doubt that many offers went astray on the ground of poor stability. It was also the practice, and still was to some extent, to give the colour an obscure name and numbering. We had now reached a stage at which there had become available a number of colours, not necessarily a large number, of good suitability for rubber work, and he described them because they might very well form the nucleus of the colours of every rubber compounder.

The author classified the organic colours as used in the rubber trade into four classes as follows:—

(1) Pure pigmentary dyestuffs containing no water-solubilising groups such as —COOH, —SO_3H, etc.
(2) Partially soluble dyestuffs possessing such groups.
(3) The insoluble salts of those colours listed under (2), *i.e.*, the so-called "toners."
(4) The truer lakes derived from ordinary water soluble dyestuffs by conversion to their insoluble salts.

The author went on to give a tentative list of the organic colours which might be regarded as standard and of general acceptance on account of their long use and good properties; to indicate factors controlling the finer points of those colours, bearing in mind their application to rubber compounds; and also discussed the alternative methods of colouring rubber by means of pigment pastes in factice, latex, etc.

Pure Pigmentary Colours

Of the pure pigmentary colours, he continued, the chief members were azo pigments, yellows, oranges and reds. Others were more or less included since they conform to the qualifications of that class rather than to any of the others. The yellows were mainly derivatives of aniline diazotised and coupled with aceto-acetanilides, and they varied in shade from a very greenish to redder shades of yellow. The two which found use in the rubber trade were *p*-chloro-*o*-nitraniline coupled with *o*-chlor-aceto acetanilide, and *m*-nitro-*p*-toluidine coupled with aceto-acetanilide. Those colours were high strength pigments of excellent stability, but their one defect was a slight solubility in rubber. In the two examples quoted that defect was not very serious. The latter one was used widely chiefly on account of its strength and reasonable production costs, but was used preferably where its solubility was of no effect, *i.e.*, in self colour goods and not in mottles. The oranges were very similar colours, but free from the defects of rubber solubility. The reds were of the type obtained by coupling β-naphthol with diazotised *m*-nitro-*p*-toluidine. In addition to the yellows, oranges and reds which formed the members of class (1), there were some extra pigment colours in that class. The first was the well-known dull green made by using the ferric compound of nitroso-β-naphthol. He also mentioned the vat colours, chiefly the anthraquinone blues. In general, he said that the colours in class (1) had an extremely high order of fastness and stability. The true member of the class, *i.e.*, the azo pigment, showed a slight solubility in rubber, though that was not the case with the pyrazolone azo colours. The other colours he had indicated did not show those defects.

Coming to the pigments possessing slight water solubility, he said they were generally of the azo series, but in a rather more water soluble form, *i.e.*, as sodium salts of acidic derivatives. There were many members of that class, but not many were used in the rubber trade, and he included just two of them in his lists of tentative standard colours, those two being tobias acid (β-naphthylamine-1-sulphonic acid) and *o*-chlor-*m*-toluidine-4 sulph. acid, each coupled after diazotisation with β-naphthol. The effect of their substitution was to obviate the defect of rubber solubility, but to replace it by a slight solubility in water. That was particularly evident at the boil. The net result of the change was to lose one defect at the expense of acquiring a new one which fortunately was not so serious as the old one. The consequence in rubber work was that a slight bleeding in open steam cures was evident. The same stability against reagents was still evident, however, and the light fastness was of a reasonable order. The colours found good use in many cures, chiefly in press cure work, where their water solubility was of no importance.

As to the third class, *i.e.*, the insoluble salts of the partially soluble pigments, he said that the pigments consisted of the barium or calcium salts of the colours mentioned in class (2), and in order of development showed the best properties for rubber colours. The effect of converting the sodium salt to an insoluble barium salt was to overcome almost completely the defect of bleeding in open steam cures. In the redder shade pigment, *i.e.*, that derived from tobias acid with β-naphthol, the sodium salt was a normal scarlet: the barium salt was bluer in tone, while the calcium derivative was a good crimson. In the case of the orange shade colour, so far as he was aware, only the barium salt was used. That was a neutral red shade pigment. Two further colours he mentioned were obtained by coupling *p*-toluidine-*m*-sulphonic acid in the first place with hydroxy naphthoic acid and in the second place with -naphthol-5-sulphonic acid. The resultant partially soluble pigments were converted to their calcium salts and yielded firstly a rubine shade and secondly a deep maroon or bordeaux. They were very well known colours in the trade. The maroon shade pigment was capable of being produced with a much bluer shade by the conjoint use of manganese in the precipitation with calcium.

Lakes from Water Soluble Dyestuffs

The lakes from water soluble dyestuffs (class 4) constituted probably the largest available class of colour matters for rubber, and was possibly most abused. Without extensive experience one was at a loss to see any law and order in the results of using the dyestuffs in lake form in rubber compounds. Mr. Jones had the theory that there was little necessity to use that class of colour to any extensive degree, because the yellow to red portion of the spectrum was already fairly well covered by the preceding classes; only in the case of bright blues and greens did he see any justification for the use of normal dyestuff lakes, and possibly for violets and weak rubber-insoluble yellows. Generally price played a part in their adoption, since they usually possessed considerably larger quantities of base and the like than did the pure pigments and their close derivatives. It was rather rare to find a lake which possessed many of the virtues. More often were they suitable for a single piece of work than for general application.

Dealing with suitable lakes made from soluble blue and green dyestuffs, he said the most useful class of dyestuff was the triphenylmethane series. The anthraquinone colours found use, and to a lesser extent, the speciality colours such as the quinoline yellows for greens in conjunction with tri-

phenylmethane blues. The author gave the following list of well-known acid colours which were particularly useful for use in the colouring of rubber in lake form.

Naphthol Yellow S.
Quinoline Yellow.
Erio Fast Brillt. Fuchsine.
Erio Green B.
Erioglaucine Supra.
Erio Chrome Cyanine R.
Pure Acid Blue R Supra.
Acid Violet 6B Supra, etc.

The basic colours which were advised, but only in the form of their phospho-tungstic acid lakes and the like, were methyl violet in its various forms, Setopaline Supra, Victoria Blue B, etc. All were of satisfactory fastness to press cures but some failed in open steam cure. They also varied in light fastness, though that was generally of a high order.

Summarising the colours he had put forward as the typical and best organic colours for rubber work, he said that the pure pigmentary colours (class 1) were non-reactive from the point of view of reagent attack and stability during cure. Light fastness was invariably excellent. The only defect appeared with the insoluble azo pigment, which showed a slight solubility in rubber. Class (2), the sodium or ammonium salts of acid derivatives of the pure azo pigments, showed insolubility in rubber but were rather more reactive, especially as regards bleeding in open steam cures. The natural inheritance of a water soluble grouping was neutralised by sodium. Class (3), the insoluble salts of class (2), were theoretically the best and were very good in practice, free from the defects of the previous two types. Classes (2) and (3) varied in light fastness but generally that property was good. In class (4), which could contain very different types of colours, some were of satisfactory light fastness (*e.g.*, the phospho-tungstic acid lakes of basic colours) but others were of inferior light fastness. They were useful in all cures but should be carefully watched in open steam.

Discussing the testing of rubber colours by the colour maker, Mr. Jones said it was axiomatic that the correct test, even for a simple control test, was a real evaluation in the material for which the colour was destined, *i.e.*, a rubber compound. He advised resort to such a test wherever possible, and said that even if it were out of the question one should not be content with a simple oil rubbing.

Referring to paste colours in rubber compounding, he said that in latex work the use of water pastes was quite axiomatic, preferably improved by a ball milling in the presence of a powder disperser. To demonstrate the advantages of the use of paste materials in masticated rubber he chose the anthraquinone vat colours, as pigments having the desired properties to a degree which processing rendered them commercially attractive. Many deviations from the straightforward precipitation in latex,, he said, had been evolved. The chief developments were (1) the use of a factice dispersion which was mixed with the pigment paste and then coagulated, or alternatively, the transfer of the pigments from water to another oily media and the subsequent conversion of it to a factice; (2) the use of modified latex precipitation by the conjoint use of stearic acid. He understood that that was used to improve the milling qualities of the latex rubber paste, since with high colour concentration the so-called pigment paste became rather friable and powdery.

Mineral Pigments

Dr. H. J. STERN dealt with the inorganic colouring matters used in rubber, excluding those giving white or black. In the first place, for the benefit of the oil and colour chemists, he discussed the processes involved in rubber manufacture, and said that it followed from the consideration he had put forward that the best inorganic pigments for use in rubber would be the sulphides.

Probably until 1919 or 1920 very few suitable organic colours were known or used, whereas inorganic colours had been used for many years. In very many cases organic colours had taken the place of the inorganic colours formerly used, but in others the inorganic colours were still employed. In the first place, there were certain types of work in which even a newcomer would find the inorganic colours preferable. For example, if the period of vulcanisation was long or the temperature was very high it was often difficult, though not impossible, to secure suitable organic colours. Secondly, in many cases a manufacturer had started with an inorganic colour, and the makers of the organic equivalent had not been able to make out a good case for changing. There was also the price consideration. The quantity of organic colour required to produce the same shade as was produced by the equivalent inorganic colour was much smaller, but the price was usually correspondingly higher.

With regard to antimony sulphide, which had been used since the earliest days of the industry, and the reasons why such an out-of-the-way pigment should be chosen as a colouring matter, he pointed out that frequently it had to withstand long heating at 130°-140° C., and the colouring matter used in articles such as bottle rings, for example, the colour must also resist sterilisation afterwards, it must not bleed in solvents such as alcohol and also must not change with alkali. The tendency to blacken was a most annoying feature of antimony sulphide manufacture, and in that connection he mentioned a paper by Bierer, in 1920, dealing with the blackening of the so-called crimson antimony. The essential point, Bierer had concluded, was to start from pure antimony chloride.

Another inorganic colouring matter was arsenic sulphide, which gave pale yellow shades not easy to imitate with organic colours. Arsenic sulphide might be regarded as a true accelerator in rubber curing; 3 per cent. of arsenic sulphide would reduce the time of cure to one-third in a mix consisting of 90 parts india rubber and 10 sulphur.

Cadmium sulphide was also a very good pigment for rubber, and could be obtained in a wide range of shades, from yellow to light orange, according to the method of preparation. By the use of selenium, cadmium sulpho-selenides were obtained, and the range of the cadmium colours could be extended into the red or even purple. The cadmium reds were also very good pigments, the chief drawback being their high cost, which was no doubt one of the reasons why they had not to any very great extent replaced vermilion. He also mentioned cadmium lithopone, in which the zinc of ordinary lithopone was replaced by cadmium. In that case also no doubt cost had retarded its adoption.

Of the red inorganic colouring matters, vermilion was perhaps the most used and it was stable to all ordinary vulcanising conditions. The colour of the vermilion itself might vary over a certain range; the more the pigment was ground, for instance, the paler was the shade. Apart from ebonite, vermilion was still used in rubber in certain cases—as, for instance, in cut sheet—where no organic colour had replaced it. No doubt it could be replaced by cadmium red, but again the question of cost arose.

The chief point of interest in connection with the iron oxide colours in rubber was that of ageing; sometimes the rapid and complete deterioration of goods coloured with iron oxide was remarkable, and that peculiarity had been the subject of much investigation. The bad cases of ageing that he had seen or heard of had been of goods cured in open steam. The ochres and the naturally occurring oxides were used to some extent, but they suffered from the disadvantage of having low colouring power.

Ultramarine was available in a certain range of shades and was reasonably cheap, but it had not a very high colour-

ing power. Rubber coloured with ultramarine was apt to show a kind of chalky appearance on the surface, especially if subjected to wear, as in the case of flooring. According to Ditmar, it tended to change colour with certain accelerators and it did not stand up well to cold cure, presumably owing to the action of the acids. Prussian blue had been the subject of a paper, published in the Transactions of the Institution of the Rubber Industry by Dr. J. R. Scott in 1928, in which the author had said that his experiments confirmed what appeared to be the generally accepted view that Prussian blue was not a suitable pigment for india rubber vulcanised by sulphur, and also had shown that the same conclusion applied to Turnbull's blue, the outstanding faults of those pigments being instability during vulcanisation, deleterious effects on the properties of the rubber, especially as regards ageing and their poisonous nature.

Discussion

The CHAIRMAN (Mr. T. R. Dawson) asked whether the dyestuffs which were supposed to be quite insoluble would resist the action of soapy water and patent cleaners when applied to rubber flooring containing those dyestuffs. Another question was whether dyestuffs used in rubber which came into contact with foodstuffs and particularly with liquids for human consumption, contributed anything to the flavour of the liquids in contact with them. With regard to alleged poisoning by antimony, there was an enormous volume of literature on the subject disclosing two very well marked schools of thought, one of which was that antimony in rubber was extremely poisonous, and the other that it was quite harmless. There was no reconciling the two. But the Governments of Germany and France had definitely prohibited the use of antimony in all kinds of rubber coming into contact with foodstuffs, as well as with toys and articles of that kind used by children.

Colouring Transparent Rubber

Dr. J. R. SCOTT asked if there were any organic dyes suitable for colouring transparent rubber, because all the rubbers dealt with in the papers had been opaque. He asked also for the authors' views on the carrying out of accelerated light fading tests, and whether any methods had been made available for observing or measuring fading other than by merely looking at the samples.

Mr. JONES, replying to the question concerning the colouring of transparent rubber, said that one could use organic pigments having such a refractive index as to show little interference with the rubber compound. The guiding principle was that it should be extremely finely divided. We wanted a controlled apparatus for testing the light fastness, but after all, the real test was in the sunlight.

Mr. B. L. DAVIES, bearing in mind a statement by Mr. Jones that in the lake pigments the finer the dispersion the deeper the colour, and Dr. Stern's statement in regard to vermillion that the depth of tint varied considerably with fineness of grinding, asked what were the factors determining the brilliance or depth of the tint. He mentioned the phenomenon, which he had seen in browns, blues and other colours, that when the rubber was stretched the shade became paler. He had also seen various shades of brown appearing on the surface of a mix simply as the result of small calender markings or small surface defects.

Mr. JONES replied that a factor controlling brilliance was the amount of incident light reflected. With regard to the grinding of certain lake colours, there was an optimum rather than a maximum point of dispersion which differed for various pigments. He believed that lakes varied considerably in the extent to which they could be ground; if ground beyond a certain point they would fade off and show almost a bleaching action. With regard to the fading of colour due to stretching the rubber, he believed it was because the stretching of the sample interrupted the surface and rendered it optically uneven, whereas previously it was optically level, which affected the light reflection.

Dr. STERN said his remarks in the paper concerning the grinding of vermilion referred to the dry vermilion before it was put into the rubber. He understood that the various shades were controlled by the degree of grinding. The conditions of dry vermilion were quite different from those obtaining after it was put into the rubber.

Mr. N. OEHLCKE said that research by dyestuffs manufacturers during later years had been in the direction of producing compounds which did not break down as the result of the action of light, and they were slowly finding their way. He asked whether there were any regulations in this country concerning the use of antimony in rubber compounds in contact with food.

The CHAIRMAN replied that there were no regulations whatever in this country governing the composition of rubber for any purpose; but if anyone were poisoned as the result of any particular ingredient in the rubber, one had to accept the responsibility under the terms of the Food and Drugs Act.

Colours as Preservatives

Mr. V. H. WENTWORTH asked if the authors could refer to recent work in which colours were used for the purpose of preserving the rubber in which they were mixed. The matter arose particularly in connection with the balloon barrage scheme for aerial defence, in which a large number of balloons would be subjected to light and air for long periods.

Dr. STERN replied that that consideration would take us beyond the field of colour pigments and more into the realm of anti-oxidants. In rubber articles where the chief requirement was good ageing, colour did not really matter, and the articles were generally made black. It was of interest that until recently the best anti-oxidants did tend to stain on exposure to light; if a white article containing a good anti-oxidant were exposed to light it was liable to turn brown, thus giving it something of the protective effect to which Mr. Wentworth had referred.

Estimating Copper in Iron Oxide Pigments

Dr. TRAVERS SMITH said that he believed that manganese and copper were the two substances in iron oxide which were usually regarded with disfavour by the rubber manufacturer, and he asked Dr. Stern what he regarded as the best method of estimating copper in iron oxide pigments.

Dr. STERN replied that, whilst it was recognised that traces of copper and manganese caused bad ageing in rubber, it was possible to have an iron oxide free from traces of copper and manganese, and yet it would still give bad ageing owing to the soluble sulphates of iron which it contained. Quite a number of methods had been published for the estimation of copper. A summary of methods of detecting traces of metals had been published in *The Analyst*. One method was based on a di-thio-carbamate reaction, he believed. There was certainly no scarcity of methods based on the use of special organic reagents for the determination of traces of copper. But such methods were not particularly useful in connection with rubber compounds, because even in the absence of copper bad ageing could occur. The only real test was to try it out in the rubber mix.

Mr. F. H. COTTON, bearing in mind Mr. Jones' reference to refractive index, discussed the mechanism by which pigments coloured rubber, and asked whether, if an inorganic pigment could be ground sufficiently finely, it could be used satisfactorily for producing a transparent rubber of the same colour as the pigment would show by reflected light.

Mr. JONES replied that, provided that the refractive index approached the refractive index of rubber, a transparent effect could be produced. But even if the pigment were finely ground, and its refractive index were still vastly different, the resulting rubber would not be transparent.

Society of Public Analysts

Election of Members

AN ordinary meeting of the Society of Public Analysts and Other Analytical Chemists was held at the Chemical Society's Rooms at Burlington House on November 3, with the president, Dr. G. Roche Lynch, in the chair.

Miss M. B. Elliott, M.B.E., was elected an honorary member of the Society. The following were elected ordinary members:—D. C. M. Adamson, A.I.C., B. Boas, B.Sc., E. Oddy, G. L. Ransome, B.Sc., A.I.C., and R. F. Wright, B.Sc., A.R.C.S., F.I.C.

Certificates were read in favour of the following candidates for membership:—H F. Bamford, B.A., C. R. Bond, M.Sc., F.I.C., F. A. Dawson, B.Sc., John Hawthorne, B.A., Ph.D., F.I.C., G. Moses, A.M.C.T., F.I.C., M. Robinson, B.Sc., A.I.C., and J. L. Wilson, M.Sc., F.I.C.

The ascorbic acid content of fruit and vegetables was the subject of a paper by Mamie Olliver, M.Sc., A.I.C. Variation in the ascorbic acid content of gooseberries, blackcurrants, strawberries, peas, potatoes and asparagus was studied by the micro method of determination with 2:6—dichlorophenol—indophenol. Tests were made at all stages of growth: the effects of degree of ripeness, time of picking and size of fruit were investigated, and in some instances the distribution of ascorbic acid in different parts of a fruit.

A report on the 1937 World's Dairy Congress at Berlin was presented by W. L. Davies, Ph.D., M.Sc., F.I.C. The report dealt with papers submitted on the conditions of production and marketing of milk, with visits to factories, etc., concerned with milk and allied industries and with the exhibition of machinery and plant used in these industries.

In a paper on the routine determination of glycogen in oysters, John P. Tully, of the Ministry of Fisheries, Canada, described a study of the application of Pflüger's method to the determination of glycogen in fresh oyster flesh, and recommended a suitable procedure. The oyster flesh is digested for 3 hours at 100° C., with 55-60 per cent. potassium hydroxide solution, and the glycogen is precipitated from the digestion liquor by alcohol at 55-60 per cent. concentration with the aid of heat. After reprecipitation, and hydrolysis with hydrochloric acid the glycogen is determined as glucose by copper reduction.

Tar for Road Making

Progressive Development Continues

IN his presidential address at the annual luncheon of the British Road Tar Association, held at Grosvenor House, Park Lane, London, on November 4, Sir David Milne-Watson pointed out that the problem of road tar was never static. Until a few years ago, tar was unchallenged in this field, but it has now two important competitors, namely, bitumen and concrete. This has promoted a healthy rivalry, which has led to intensive research and experimental work, and has brought about a rapid development in the utilisation of these various materials for road construction. It was gratifying to note, however, that in the last year or two, the use of tar has been on the up-grade, in spite of the increased life which is being obtained from tarred surfaces, and the competition of rival materials.

One of the main duties of the British Road Tar Association is to see that progressive development continues unabated, not only in regard to the quality of the tar itself, but also in regard to the technique for its use in road construction—an aspect to which all concerned should give even more attention than they have done in the past.

After paying a tribute to the work of the late chairman, Sir Reginald Clarry, who had resigned after a period of seven years', Sir David welcomed the new chairman, Mr. J. Davidson Pratt, general manager of the Association of British Chemical Manufacturers.

Glass Foundation Block

Ceremony at Sheffield University

THE 21st anniversary of the Society of Glass Technology was celebrated at Sheffield on November 9 by the laying of the foundation block, which was of glass, for the Sheffield University Department of Glass Technology's new buildings at "Elmfield," Northumberland Road. The new buildings have been made possible by an appeal launched by the department for funds to extend their premises at an estimated cost of £45,000.

Lieut.-Colonel Sir Henry K. Stephenson, pro-chancellor of Sheffield University, said the public spirit that glass manufacturers throughout the country had shown was something of which to be proud, and he hoped it might be followed in respect of other departments of the University which at present were badly in need of money. The University was most grateful to the members of the Glass Delegacy for their generosity. It had been estimated that a sum of £45,000 would be required for the full scheme of adaptation and extension of the new building, but that a smaller sum would justify the removal of the University's glass works from Darnall Road to "Elmfield." The smaller sum had been very much over-subscribed, though some £10,000 was wanted to complete the full scheme.

Professor W. E. S. Turner, president of the Society of Glass Technology and head of the University's glass department, placed a glass casket containing records of the glass department, which was founded in 1915, in a wall cavity of the new building.

Mr. Geoffrey Pilkington, a director of Pilkington Bros., of St. Helens, laid the foundation block which is of solid glass has a rough cast surface, and weighs four hundredweights.

Following the laying of the foundation block the Frank Wood Memorial Library was opened. Dedication and thanks was offered by the Bishop of Sheffield (Dr. H. Burrows), the library being opened by Mr. S. B. Bagley (chairman of the Glass Research Delegacy). The late Mr. Frank Wood was the first president of the Society of Glass Technology and chairman of the Glass Delegacy.

Factory Lighting

A New Committee Appointed

THE Home Secretary has appointed a committee to review, in the light of existing knowledge and practice, the recommendations made in the reports presented in 1915, 1921, and 1922 by the Departmental Committee on Lighting in Factories and Workshops concerning the conditions necessary to secure adequate and suitable illumination in such works or in any class or description thereof or for any particular process, and to advise about standards of sufficient and suitable lighting proper to be prescribed by regulations under section 5 (2) of the Factories Act, 1937.

The members of the new committee are:—Mr. D. R. Wilson, H.M. chief inspector of factories (chairman), Mr. J. S. Dow (secretary of the Illuminating Engineering Society), Mr. John A. Gregorson (general secretary of the Iron and Steel Trades Employers' Association), Miss Florence Hancock, Professor H. Hartridge, F.R.S., M.D., Mr. C. S. Myers, F.R.S., M.D. (principal of the National Institute of Industrial Psychology), Sir John Parsons, F.R.S., M.B., Mr. William Scholes (of Bleachers' Association, Ltd.), Mr. G. W. Thomson, Mr. J. W. T. Walsh, D.Sc. (of the National Physical Laboratory), and Mr. H. C. Weston (of the Industrial Health Research Board). Mr. Gregorson and Mr. Scholes were nominated by the National Confederation of Employers' Organisations and Mr. Thomson and Miss Hancock by the Trades' Union Congress.

The secretary of the Committee is Mr. R. W. Daniel, to whom all communications should be addressed at the Home Office, Whitehall, S.W.1.

Dewaxing Oil Products with Heavy Solvents

By
DR. BRUNO ENGEL*

IT is well known that the dewaxing of mineral oils and their products has for its main purpose, besides the production of crude and pure wax, the preparation of lubricating oils with low pour points. In practice, the separation of the wax from the mother liquid is generally carried out at low temperatures by means of pressing, settling, filtering or centrifuging, after the addition of solvents which precipitate the waxes and keep the valuable oil components in solution.

Suitable Solvents

As suitable solvents for this purpose, many different classes of oranic compounds have been used, of which only those classes comprising hydrocarbons, alcohols, ketones, esters and their mixtures need be mentioned here. Besides these compounds, chlorinated hydrocarbons have lately come into use as wax precipitants and oil solvents. This may be attributed to their easy technical handling, and to their characteristic selectivity in precipitating the paraffinic components and dissolving the lubricating oil components. The following considerations illustrate these characteristics:

It is of no importance if the wax is only slightly soluble in a certain solvent A at two different temperatures t_1 and t_2, where the difference in solubility compared with the oil to be separated is not sufficiently great. If, however, the wax and the oil can be mixed in any proportion with a solvent *B* at a temperature t_1, and if a certain difference in solubility appears only at a lower temperature t_2, dewaxing can still be successfully carried out. If L_1 is the solubility of oil or wax in a solvent at a temperature t_1, and L_2 is the solubility at a lower temperature t_2, the solvent giving the highest values of $\frac{L_1 - L_2}{L_1}$ for the wax and simultaneously the lowest value for the oil will be the best one for dewaxing purposes.

This requirement is met by the chlorinated hydrocarbons of which the saturated chlorinated derivatives rank foremost. It has moreover been found that for homologous hydrocarbons with increasing chlorine substitution, the wax solubility rises in much the same way as it falls at constant halogen content but with increasing hydrogen content, *i.e.* in the following order: substituted methanes, olefines, naphthenes, aromatics. In the case of evenly substituted chlorinated hydrocarbons, as far as the above-mentioned solubility characteristics are concerned, those which are symmetrically substituted are superior to the unsymmetrically substituted ones.

Characteristics of Dichlorethane

As a basic solvent for dewaxing with chlorinated hydrocarbons, dichlorethane has proved to be particularly suitable. This solvent has the following characteristics: specific gravity at 20° C. 1.26, specific heat at 30° C. 0.305, latent heat about 80, solubility for water 0.1 per cent. and boiling point 84° C. Trichlorethane is also excellent, but has a higher boiling point (114° C.) than dichlorethane. On the other hand, ethyl chloride, C_2H_5Cl, is not as suitable, its high vapour pressure (boiling point 13° C.) and low specific gravity, rendering it unsuitable for handling in settling-tanks and centrifuges.

It is well known that besides waxes and lubricants the oil products to be treated contain other components such as resins and asphalts, the molecular weight of which can vary within wide limits, depending on the boiling range and the degree of ageing of the raw material. These more or less harmful compounds have a detrimental effect on almost any known dewaxing process.

In order to eliminate these harmful bodies, it is usual to introduce a refining process into the filtration which, without special precautions, results in excessively high losses of valuable lubricating components. These deleterious compounds are, of course, perceptible even when dewaxing with chlorinated hydrocarbons, although not in a detrimental way. Experience has shown that when dewaxing with these solvents, either a true solution or a precipitation of polymerised or condensed products can be obtained, depending on the nature of the oil to be dewaxed. In this way the last-mentioned products may either be divided among the components to be separated or removed together with the wax.

In order to illustrate the above, consider the dewaxing of the following two extreme products: (1) A paraffin base oil. (2) An asphalt base residue.

In the first case chilling in dichlorethane solution results only in a separation of the waxes, and an oil having a pour point below the dewaxing temperature may be obtained. In the second case the asphalt bodies having the highest molecular weight are precipitated, besides the waxes and on filtering or centrifuging, an oil having a pour point equal to the separating temperature may be obtained. Of course, when treating these oils rich in asphalts with the above-mentioned solvents, they are greatly conserved owing to the physical refining which takes place simultaneously with the dewaxing. If a subsequent refining should prove necessary, the corresponding losses will thus be reduced to a minimum.

Difficulty with Colloidal Dispersions

The process is, of course, also suitable for the third group of oils, viz., the mixed base oils. These oils are characterised by their content of polymethylenes (naphthenes), polycyclic compounds, highly condensed products, etc. Since the constitution and molecular weights of these compounds vary within very wide limits, some, when treated with dichlorethane at a reduced temperature, may go into true solution, others may be precipitated, whilst still others may be colloidally dissolved or suspended.

In view of the well-known detrimental effect of colloidally dispersed components on any mechanical separating process, one has to employ remedies which will eliminate the colloidal character. This can be attained by means of auxiliary solvents, either by dissolving or by precipitating the above-mentioned compounds. As dissolving agents, benzol, toluol, xylol and other aromatic hydrocarbons, unsaturated hydrocarbons and their chlorine derivatives, *e.g.* trichlorethylene, may be used. As suitable precipitating agents may be mentioned ketones (such as acetone, methyl ethyl ketone, methyl *iso*butyl ketone), esters (such as methyl formate, methyl acetate and their homologues), alcohols, etc.

Suitability of Aromatic Hydrocarbons

Of the "solvents" mentioned above, the aromatic hydrocarbons, *e.g.* benzol, toluol, etc., have the advantage of a relatively high value for the fraction $\frac{L_1 - L_2}{L_1}$. In many cases a combination of 75-78 per cent. dichlorethane and 25-22 per cent. benzol is used in practice in conjunction with centrifuges, whereby an easy separation of the light wax and the heavy mixture of oil and solvent is effected.

Another advantage to be considered in practice is the comparatively low degree of dilution and the moderate chilling required for precipitating the wax, when dichlorethane-benzol mixtures are used. Moreover, from an energy point of view, the process is inexpensive The conditions for using the second group of auxiliary or additional solvents, especially the lower esters of formic and acetic acid and ketones which are resin and polymer precipitants, have proved to be equally

* Abstract of a paper presented at a meeting of the Institution of Petroleum Technologists on November 9.

favourable. The water solubility of the latter does not matter at all, since by adding dichlorethane a practically complete dehydration of the water-saturated esters or ketones can be obtained.

Depending on the requirements for the final products, one group or the other of auxiliary solvents, or a pure chlorinated hydrocarbon should be employed. According to the degree of the dissolving or precipitating effect on the polymers, waxes of different quality may be obtained. It should be observed that if the polymers are removed together with the wax, the melting point of the latter is mostly reduced by the complex character of the polymers, since, as is well known, certain polymerised products act as pour-point reducers.

Effect of Mixture on Polymers

The following table shows the effect of dichlorethane and dichlorethane mixtures on polymerised products:

	Content of Polymers.		
Solvent.	*Nil.*	*Medium.*	*High.*
Dichlorethane	True solution	Colloidal solution.	Non-reversible precipitation
Dichlorethane + dissolving agent	,, ,,	True solution	Colloidal solution
Dichlorethane + precipitating agent	,, ,,	Formation of flakes	Non-reversible precipitation.

The above table is, of course, only of a general nature, and it should be noticed that in many cases the oils to be treated are of a mixed nature and that the optimum dewaxing conditions are preferably determined by preliminary tests. Supposing that a complete separation of polymers with the wax is to be avoided, then the dewaxing of residues, rich in resins and asphalts, can be advantageously carried out by means of centrifuges, since the dissolving agents added partially transfer those bodies which impair separation, into the colloidal state, as shown in the table above, with the result that gravity settling would take place very slowly and filtration could be carried out only until filter pores became clogged. Consequently, centrifuges offer the only satisfactory means of separation.

The proportion of solvents, such as benzol, to be added to dichlorethane, can be varied according to the quantity of polymers present in the oil. This is particularly the case with aged and thermally pretreated oils, the resin contents of which may be such that an addition of up to 40 per cent. of benzol may be required. In centrifugal dewaxing there are certain limits for the addition of benzol, since the difference in specific gravity between the solvent and wax is reduced with an increased proportion of benzol. In such cases, dichlorethane can be replaced to a greater or smaller extent by the heavier trichlorethylene. Also mixtures of trichlorethylene with ketones or benzol as well as mixtures of dichlorethane with carbon tetrachloride can be used for obtaining the desired result.

Progressive Precipitation

By means of dichlorethane together with ketones, the polymers can be precipitated in a non-reversible state, the treatment thus being comparable with a physical refining process. This precipitation can also take place progressively and in several steps with decreasing temperature, whereby the separation of wax and resins takes place according to their molecular weight. Also the dewaxing as such can be carried out to advantage in several stages, viz., in two alternative ways: (1) By fractional precipitation of wax at different temperatures and constant solvent proportion. (2) By fractional deoiling of wax by means of solvent distribution in separate stages. The main advantage of this multi-stage process is the possibility of obtaining a maximum yield of oil with a minimum of solvent. Besides ensuring a higher yield, the multi-stage process has the advantage of giving under certain conditions a better quality of oil, the selectivity of the above-mentioned solvents ensuring also a lower wax concentration when using a reduced quantity of solvent.

The proportions of solvent to be used in the first and the second stage, respectively, can, of course, be varied in relation to each other, with due regard to technical considerations in centrifuging. It should be noted that the primary wax always contains a certain proportion of solvent, and that the additional quantity of solvent required for the second treatment can thus be reduced. According to experience, the first stage should always be carried out with the smallest possible quantity of solvent, since a more satisfactory pour point for the primary oil can then be obtained by moderate chilling. When using chlorinated hydrocarbons as solvents for multi-stage dewaxing, it is not necessary to re-dissolve the wax after each stage and then chill the wax again. This is an advantage of the chlorinated hydrocarbons over most other solvents.

Factors in Chilling

The question of chilling conditions is of particular importance during dewaxing. The rate of chilling and flow conditions prevailing in the liquid during chilling, the effect of under-chilling, thixotropy, and redissolving, owing to fine dispersion of precipitated particles, etc., play an important part. Moreover, the influence of the colloidally precipitated and/or redissolved resins and asphalts on the crystallisation and solubility of the waxes must be considered. It is thus obvious that the optimum conditions for obtaining the best possible yield and qualities can only be determined empirically. The necessary chilling time, from room temperature to — 10 or — 20° C., varies from ½ to 2½ hours, depending on the content of higher polymers as well as on the wax content of the oil. When centrifuging, the viscosity of the mixture is also of importance, and it is well known that the viscosity of a liquid containing a certain amount of solids is lower the less colloidal is the degree of dispersion. Reduced viscosity facilitates the precipitation and results in a higher yield, owing to smaller quantities of occluded oil. In order to ensure a good crystallisation of wax out of oils free from resins, but rich in wax, it is often of advantage to increase the time of chilling up to the above-mentioned upper limit of about 2½ hours.

Variation of Yield and Pour Point

Experience has shown that when using less dilution, the time of chilling may be reduced, which is also the case if a mixture of dichlorethane and benzol is used instead of pure dichlorethane. Moreover, the chilling should be carried out as evenly as possible and with a medium degree of agitation, so as to ensure a partly laminar and partly turbulent flow of the liquid. Yields as well as pour points can be varied in any desired direction, simply by varying the composition of the solvent, the temperature and the degree of dilution.

Depending on whether a removal of polymers simultaneously with dewaxing is desired, and with due regard to the requirements not only of the lubricating oil, but also of the wax, dichlorethane and trichlorethylene may be used alone or in combination with dissolving or precipitating agents. If the dewaxing does not take place until after a previous refining, the use of dichlorethane alone or in the presence of precipitants is generally of advantage, since the differences against the polymer-free distillates are then eliminated. When treating long cuts, dichlorethane alone should generally be preferred, and in the case of aged products or residues, a certain addition of solvents such as hydro-aromatics, aromatics, or unsaturated compounds is preferable. It is obvious that the solvents and their combinations described above can be used not only for dewaxing of lubricating oils and their fractions, but also for deoiling of petrolatum, purification of crude wax, etc.

Production of artificial horn products from soya bean has been commenced by the "Chema" Co., in which the American Du Pont concern holds a financial interest. Experiments are also being initiated with a view to producing rubber substitutes from vegetable raw materials indigenous to Bulgaria and Jugoslavia.

The Team Valley Estate

Fifty-Six New Factories

(By a Special Correspondent)

AT the invitation of Colonel K. C. Appleyard, O.B.E., J.P., chairman of the North-Eastern Trading Estates, Ltd., a representative of THE CHEMICAL AGE visited the Team Valley Estate, near Newcastle, on November 5. The chief guest was Sir Frederick Marquis, industrial adviser to the Commissioner for the Special Areas and to the Treasury. Fifty-six factories have been let—an average of one a week since work began on the estate a year ago—and a tour of those already in production suggests that the number of tenants will increase progressively with the completion of the estate. Over two miles of railway, three miles of roads and eight miles of sewerage have now been laid by the 1,200 workmen engaged on this site, while the River Team which flows through the valley has been "straightened" in a concrete channel. The potential employment of the factories at present being built is about 6,800.

Some Industries on the Estate

As the Team Valley is within half a mile of the Great North Road, Sir W. G. Armstrong Whitworth and Co. have shown commendable enterprise in opening a service depôt for commercial vehicles on the estate. Imperial Chemical Industries and Cadbury Brothers have established warehouses for supplying the northern market.

Chemical products for the building industry are being manufactured by Chemika, Ltd. Laminated glass is made by Colmore Adhesive, Ltd., and the glass bottle factory of Houghton and Hall, Ltd., employing oil fired furnaces, is in active production. Ovens supplied by Baker Perkins are used in making meat pies and sausages by Havmor, Ltd., whose factory was the first to begin production on the Trading Estate. It opened on May 31 last, and has already built up a big wholesale and retail connection on Tyneside. A new Bakelite product is being made by the Bushboard Co., imitation veneer plywoods for tables, trays, etc., are produced by photographing the grain on to paper, which is impregnated with bakelite by pressing between highly polished steel plates. The resultant surface is heat proof.

Need for Economic and Political Thought

Following this tour of the Team Valley, a luncheon was held at Tilley's Restaurant, Newcastle. Proposing the toast of the Trading Estate, Sir Frederick Marquis said the problem of the Special Areas is not a problem that calls only for philanthropy. It calls for deep economic and political thinking. Politics in the world are moving quickly; changes that used to take generations happen now in a few years. "I have joined in this work of trying to rescue the Special Areas from poverty and unemployment because I am a capitalist, and I consider that the existence of these areas is a challenge to the whole capitalist system of this country. I do not for one moment believe that under a system of socialism another Government would be able to deal effectively with the problem, but I am quite clear that unless we help this present Government to deal with the problem we cannot be surprised if the people in the special areas, and those who sympathise with them, come to the conclusion that they had better try and see whether any other system could be worse."

Referring to the advantages offered by the Trading Estate, Sir Frederick Marquis said that the factories are new; they involve no capital outlay: they are completely serviced with electricity and heating; road and rail goes to the factory door. "The Government is anxious to encourage industrialists to come to these neighbourhoods," Sir Frederick concluded, "It is a happy and characteristically British compromise between Government trading and private enterprise."

The toast of the Trade Press was proposed by Colonel G. H. Walton, who paid a warm tribute to the help which the Press

(*Continued at foot of next column.*)

Death of Dr. J. A. Voelcker

Noted Agricultural Chemist and Sportsman

DR. JOHN AUGUSTUS VOELCKER, consulting chemist to the Royal Agricultural Society of England since 1885, died in London on November 6, at the age of 83. Born at Cirencester, he was educated at University College School, University College (London University), and the University of Giessen. He graduated B.A. and B.Sc. at London and Ph.D. at Giessen. He was also an honorary M.A. of Cambridge University. He studied chemistry in relation to agriculture and in 1885 was appointed director of the experimental farm at Woburn, Bedfordshire, holding this post until last year. He succeeded his father as chemist to the Royal Agricultural Society of England. During 1889-90 he was in India to report for the Government on how the state of Indian

Dr. J. A. Voelcker.

agriculture could be improved scientifically. His report was presented in 1893, but his work was not officially recognised until 1928, when he was made a Companion of the Order of the British Empire. The report was found to be of the greatest assistance to the Linlithgow Commission on Indian Agriculture which was formed in 1926, and it was said that his honour was conferred at the suggestion of the Commission. Dr. Voelcker had been a member of the Council of the Chemical Society and of the Institute of Chemistry, a president of the Society of Public Analysts and of the Farmers' Club. Among other positions he was agricultural analyst under the Ministry of Agriculture and public analyst for Buckinghamshire and Oxfordshire.

In his youth he was a fine athlete, and was the first honorary secretary of University College and Hospital Sports Club. He was well known in sporting circles as vice-patron of the Amateur Athletic Association and vice-president of the London Athletic Club.

(*Continued from preceding column.*)

was giving to the estate. Replying on behalf of THE CHEMICAL AGE Mr. John Benn said that trade and technical journals had a valuable part to play in drawing attention to the opportunities which the special areas presented to the particular industries they served. Another question worthy of study was the location of industry on which a Royal Commission was now sitting. In congratulating Colonel Appleyard and his colleagues on the excellent layout of the Trading Estate, Mr. Benn suggested that every manufacturer in the south of England should make a journey in the new "Coronation" express to Newcastle, thus combining a new pleasure with the most important need of to-day—that business men should personally visit the Special Areas.

Personal Notes

MR. ROBERT MCCULLOCH KATER, of Kilmarnock, Ayrshire, retired analytical chemist, has left estate valued at £15,472.

MR. ALFRED CHARLES KIMPTON, of Knightsbridge, London, late delegate director of Imperial Chemical Industries, Ltd., has left estate valued at £26,304, with net personalty £21,980.

MR. J. CORKER, of the Monkton chemical works of John Bowes and Partners, Ltd., has been appointed manager of the Marley Hill works in succession to Mr. W. Diamond, who has been transferred to Monkton.

MR. ARTHUR BLAIR, of Saltcoats, one of the superintendents of the nitro-cotton department at the I.C.I. works at Ardeer, Ayrshire, has been presented with a wallet of notes from his workmates on the occasion of his retirement after 31 years' service.

PROFESSOR E. C. C. BALY, who has held the Grant chair of inorganic chemistry at the Liverpool University from 1910 to 1937, has now received the title of Professor Emeritus from the council of the university, on the recommendation of the senate.

MR. THOMAS BIRRELL CLARK, who is in charge of the I.C.I. petrol-from-coal plant at Billingham, is to be married at Hartlepool on December 4, to Miss Dorothy P. Graham, only daughter of the Mayor and Mayoress of Hartlepool. Mr. Clark is 27 and received his appointment in June, 1934.

Professor N. V. Sidgwick, F.R.S., who has been recommended for the award of a Royal Medal by the Council of the Royal Society, in recognition of his distinguished and continuous work on valency and on molecular structure. The King has approved the recommendation.

DR. PAUL DYER MERICA, director of research of the International Nickel Co. and vice-president of the International Nickel Co., of Canada, has been awarded the 1938 John Fritz gold medal for "important contributions to the development of alloys for industrial uses." Dr. Merica's extensive research in theoretical and practical metallurgy has increased scientific knowledge in both ferrous and non-ferrous fields. He has contributed generously to the science of metals, his work having covered the magnetic mechanical properties of steel; failure of brass; constitution, manufacture and application of light alloys of aluminium; heat treatment of cast aluminium alloys; precipitation theory of hardening of metals; and nickel and nickel alloys. Dr. Merica was born in Warsaw, Ind., 1889. For five years he worked as research physicist in the United States Bureau of Standards; in 1919 he became director of research of the International Nickel Co.

MR. HENRY SAYLES SMITH, of Elsecar, Yorkshire, retired gunpowder manufacturer, has left estate valued at £66,382, with net personalty £65,323.

MR. W. W. WATT has been elected to fill the vacancy on the board of the British Oxygen Co., to take effect on January 1, 1938, and has been appointed a managing director from that date. He was chairman and managing director of Ogston

Mr. W. W. Watt.

and Tennant, Ltd., the well-known Scottish soap makers until the beginning of 1935, when he went to Port Sunlight as vice-chairman of the Port Sunlight Management Committee. Mr. P. B. Liversidge ceased to be a managing director of the British Oxygen Co., on November 2, having retired from the board on that day.

COUNCILLOR E. G. EDDY, M.B.E., J.P., of B. Hepworth and Co., Ltd , chemical manufacturers, Kidderminster, has been re-elected Mayor of Kidderminster. This will be his fourth term of office.

SIR HUGH ARTHUR ROSE, Bart., of Edinburgh, chairman of Craig and Rose, Ltd., paint manufacturers, Leith, who resigned from the post of Commissioner for the Special Areas in Scotland, in May, 1937, has left personal estate in Great Britain valued at £56,080.

MR. ARTHUR J. GILLIAN, general secretary of the Chemical Workers' Union, retained his seat on the Southwark Borough Council, London, as member of the Labour group in the recent election. His colleagues have again elected him for the fourth year as chairman of the Public Health Committee.

MR. E. D. BARCLAY, M.C., B.A., retired from Southall Bros. and Barclay (1935), Ltd., at the end of October. He remains on the board of Southalls (Birmingham), Ltd. Mr. Barclay was badly wounded during the war, but in spite of the loss of a leg he is a keen sportsman—shooting, fishing and golfing.

DR. FREDERICK M. BECKET, a past president of the Electrochemical Society, was presented with the Edward Goodrich Acheson medal and a prize of 1,000 dollars, at a meeting of the society at St. Louis last month, in recognition of his work on electrothermics. He is a native of Montreal, Canada, and is president of the Union Carbide Research Laboratories.

MR. H. BERRY, a former senior lecturer and head of the pharmacy department at Birmingham Technical College, has been appointed dean of the College of Pharmacy by the council of the Pharmaceutical Society of Great Britain. He succeeds Dr. J. H. Burn, who was recently appointed professor of pharmacology at the University of Oxford. He has been reader in pharmaceutics and vice-dean of the College of Pharmacy since the end of 1933, when he left Birmingham.

PROFESSOR HANS FISCHER has been awarded the Davey medal of the Royal Society, in recognition of his work on the chemistry of the porphyrins, particularly his determination of their detailed structure by degradation and his syntheses of porphyrins of biological importance. The Copley medal has been awarded to SIR HENRY DALE, F.R.S., for contributions to pharmacology, particularly to the pharmacology of muscle and of neuro-muscular transmission.

PROFESSOR ALEXANDER SCHOENBERG has been appointed to the Chair of Organic Chemistry in the Faculty of Science of the Egyptian University, Abbassia, Cairo, in place of Professor Ahmed Zaki, Ph.D. (Liverpool), D.Sc. (London), who resigned in May, 1936. Born in 1892, Professor Schönberg studied in the Universities of Freiburg, Bonn and Berlin, and obtained his Dr. Phil. in the latter University in 1919. He was appointed Privatdozent at the Technische Hochschule, Charlottenburg, Berlin, in 1922, and Professor in the same Institute in 1926. He was elected to the Council of the Deutschen Chemischen Gesellschaft in 1932. Dismissed by the German Government in 1934, he took up research in the Department of Medical Chemistry of the University of Edinburgh (Head of the Department: Professor G. Barger). His published work has embraced a wide field of research including investigations of organic sulphur compounds, diazo-compounds, free radicals, oxidation phenomena, migration, and photo-processes.

OBITUARY

MR. HUBERT ELTON (a member of the Calcutta staff of the Burmah-Shell Oil Storage and Distributing Co. of India Ltd., has died at Calcutta, at the age of 35.

MR. GEORGE T. PATON, of Arbroath, who was for 16 years employed at the chemical works at Dowrie, died on November 9 at the age of 71.

MR. ROBERT S. JOHNSON, chairman and senior director of Carty and Son, Ltd., cask and vat makers, died on November 2, after a long period of ill-health. Mr. Johnson had been a member of the firm for 48 years.

MR. ATHOL JOHN CAPRON, who was awarded an O.B.E. for organising the production of iron and steel works plant during the war period, has died at Hathersage, Derbyshire, at the age of 78. He was a director of Newton, Chambers and Co., Ltd., and was one of the founders of the London Engineering Trades Employers' Association.

Acetate Silk Statistics

Criticism at British Celanese Meeting

PRESIDING at the 18th annual general meeting of British Celanese Ltd., in London, on November 10, Dr. Henry Dreyfus (chairman and joint managing director) stated that strong yarns are to be manufactured not only in the form of acetate, but also by additional treatment in a form which will be capable of being dyed in the same manner as viscose, but as far as fineness of filament and strength is concerned much superior to viscose. The marketing of these products is expected to have a favourable influence on the fortunes of the company, because they will greatly extend the range of products which can be made to-day with the present qualities of artificial silk.

Reference to expected co-operation and collaboration within the industry was also made by Dr. Dreyfus, who said that presumably this movement was confined to viscose manufacturers in the industry. Recently, however, various approaches had been made to British Celanese, Ltd., as a result of which there have been indications that co-operation between all sections of the industry would be welcomed, and that there exists a sincere desire for collaboration. The company desire to give due consideration to such approaches, and shareholders might rest assured that the directors of British Celanese, Ltd., would do their best to see what practical arrangements can be arrived at, whilst safeguarding the interests of the company. The company has new patents which are strong and valuable, and by enlarging their field through the marketing of new products they will continue to maintain an increasingly important and advancing position in the industry.

Acetate artificial silk production in this country was also the subject of comment, because statements have appeared in the Press purporting to show how the British artificial silk production per quarter is allocated as between viscose and acetate. The manner in which these figures are published, said Dr. Dreyfus, may give the impression that they are compiled from official sources, but as far as can be ascertained they are supplied by a small agency, who apparently take the published Board of Trade figure of total artificial silk produced and divide it as between viscose and acetate, after such inquiries as they appear to be able to make throughout the trade. The only official figures which are published are those which are issued monthly by the Board of Trade, giving the total production of artificial silk produced and excised. No official statistics of production according to the various types of artificial silk are published. British Celanese, Ltd.,

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Re-Opening of Paris Exhibition

Protest by Federation of British Industries

THE Federation of British Industries has expressed regret at the recent decision of the Bureau International des Expositions to authorise the re-opening of the Paris Exhibition in 1938. They state that this decision seems clearly contrary to the provisions of the International Convention of November 22, 1928. Article 3 of that Convention gives the Bureau power to authorise a general exhibition up to a maximum of twelve months, but it does not either directly or by implication give the Bureau power to extend the period originally authorised—in this case six months—or to authorise the shutting and subsequent re-opening of an exhibition.

In the present case considerable prejudice will be caused to the Empire Exhibition which is due to open in Glasgow in 1938. It is true that the exhibition in Scotland does not come within the scope of the International Convention, but the organisers of that exhibition chose the year 1938 in the belief that under the terms of the International Convention no other major exhibition would be held during that year.

Chemical Matters in Parliament

Chemical Industry Employment Statistics

IN the Houses of Commons on November 4, Mr. Kelly asked the Minister of Labour the number of workers registered as employed in the heavy chemical trade in September, 1936, and September, 1937?

In reply, Mr. E. Brown said the estimated number of insured persons, aged 14-64, in the chemical industry in Great Britain at July, 1936, was 231,860: the corresponding figure for July, 1937, is not yet available. The numbers of such persons recorded as unemployed at September 21, 1936, and September 13, 1937, were 16,491 and 13,424 respectively. Separate figures for the heavy chemicals industry were not available.

(*Continued from preceding column.*)

have never considered it prudent or desirable to disclose publicly production figures, and as a result of this the figures quoted for acetate are hopelessly inaccurate. Roughly speaking, the quantities published in respect of acetate appear to be more nearly an approximation of the combined production of the other acetate producers rather than a statement of the total acetate production.

The production and sales of non-inflammable celluloid, transparent paper, etc., continue to develop satisfactorily.

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From Week to Week

THE ZINC CORPORATION announces that work was suspended for 24 hours on November 4 owing to a dispute among men.

A BLEACH WORKS IN BARRHEAD, which is at present lying practically derelict, may be reopened. The owners of the works intend to install plant for a new wool-dyeing process.

THE LONDON TRANSFER AGENTS of the Dutch Company for the Exploitation of Margarine Factories will be Associated Enterprises, Unilever House, Blackfriars, E.C.4, as from December 1, 1937.

A FIRE BROKE OUT in a warehouse tenanted by J. Bibby and Sons, Ltd., seed crushers, in King Edward Street, Liverpool, on November 1. Seven hundred tons of cotton seed was stored in the warehouse.

PRELIMINARY PROSPECTING has shown that lead ore exists in the county of Caithness at various places, extending fifteen miles across the country from Dalmore, Westerdale, to Forss, which lies to the west of Thurso. Shafts are now being sunk at Halkirk, Skinnet, Achinarras and Achlone.

FOLLOWING NEGOTIATIONS with the Transport and General Workers' Union, Imperial Chemical Industries, Ltd., has decided to grant wage increases to the process workers amounting to £30,000 per annum. This is apart from the demand for a 6s. rise for chemical workers, which is now before the chemical manufacturers of the whole country.

MEMBERS OF THE STAFF of Peter Lunt and Co., Ltd., soap manufacturers, Aintree, Liverpool, were entertained to a dinner and dance a few days ago, by the chairman of the company, Mr. J. H. Wootton-Davies, J.P. During the dinner a wedding gift, consisting of a canteen of cutlery was presented to Mr. and Mrs. Wootton-Davies on behalf of the staff.

PART OF THE RESIDUE OF THE PROPERTY of Mr. George Edward Henderson, of Newcastle, who left £1,327,412, with net personalty £1,295,224, has been bequeathed to Armstrong College, Newcastle, for a "George Edward Henderson Fund," to be applied to the advancement and promotion of general science, and for the general purposes of the college.

THE FINANCING OF IRISH NATIONAL REFINERIES, LTD., having been fully provided for without contribution from the funds of London and Thames Haven Oil Wharves, Ltd., or guarantee in respect thereof, the need for an increase in the company's capital, as foreshadowed by the chairman at the general meeting in March, 1937, no longer exists. The company and its shareholders will have an opportunity of participating in Irish National Refineries, Ltd., should they so desire, as and when an offer is made of the refinery company's capital.

NEARLY TWO THOUSAND PUBLICATIONS on the subject of coal have been prepared by engineers and chemists of the United States Bureau of Mines, since it was first organised in 1910. The various items are described in a bibliography just issued by the Bureau. References are given under eighteen subject classifications covering the occurrence, composition, properties, mining, preparation, and utilisation by combustion, carbonisation, gassification and liquefaction of coal. This 145-page bibliography is published as Technical Paper 576, and is obtainable from the Superintendent of Documents, Government Printing Office, Washington, D.C., at 5 cents per copy.

TAPER LEAD SEALS FOR STONEWARE CHAMBER SPRAYS, which simplify nozzle inspection and only allow stoneware tip and end of lead part to be in contact with acid fumes, are described in a leaflet of H. T. Watson, of Widness. They also supply "Monarch" spiral type stoneware spray nozzles, which consist of tip and internal spiral of stoneware, rubber washer, and lead or hard rubber socket; Monarch "Solid Spray" hard rubber two-piece nozzles, which give full flow and uniform "solid" distribution; and "Monarch" non-clog spray nozzles, which produce a fine hollow cone spray (about 80-90° angle) and have the non-clog feature—only one hole entering the swirl chamber.

THE NATIONAL SAFETY COUNCIL, of Chicago, announces that the Executive Committee of the Chemical Section for 1937-38 is constituted as follows:—General chairman, H. L. Miner, E. I. du Pont de Nemours and Co.; vice-chairman (programme), Ralph L. Rogers, Jr., Tennessee Eastman Corporation; vice-chairman (engineering), Ralph O. Keefer, Aluminium Co. of America; secretary, R. S. Mackie, General Electric Co.; news letter editor, F. W. Dennis, Hooker Electrochemical Co.; health committee chairman, Dr. Leonard Greenberg, New York State Department of Labour; membership committee chairman, C. E. Sevrens, Merrimac Chemical Co. Inc.; statistics committee chairman, R. C. Stratton, The Travellers' Insurance Co.; visual education committee chairman, E. L. Root, Celluloid Corporation. Other members include: A. L. Armstrong, Eastman Kodak Co.; E. F. King, Lever Brothers Co.; S. D. Kirkpatrick, editor of "Chemical and Metallurgical Engineering"; John Roach, Deputy Commissioner of Labour; John S. Shaw, Hercules Powder Co.; Plumer Wheeler, American Cyanamid Co.; and S. E. Whiting, Liberty Mutual Insurance Co.

NEGOTIATIONS ARE PROCEEDING with Japan for the sale of about 150,000 tons of salt from Madura, Netherlands East Indies.

THE INTERNATIONAL CARBIDE CARTEL held two long meetings in Paris on November 8, but was unable to conclude the business on the agenda.

THE PRESIDENT OF THE MEXICAN REPUBLIC, General Cardenas, has seized 350,000 acres of land belonging to the Standard Oil Co. The seized land, which was part of 2,000,000 acres of oil territory in the three Southern States of Tabasco, Campeche and Chiapas, has been nationalised by decree.

PRESIDING AT THE ANNUAL MEETING of Anglo-Transvaal Consolidated Investment Co., Ltd., in Johannesburg on November 5, Mr. A. S. Hershov stated that there was a huge reserve of cheap coal in South Africa, which was convertible into petrol. He said that the company had made exhaustive inquiries on the possibilities and he predicted the establishment of a new national petrol-from-coal industry.

THE CHEMICALS AND SCIENTIFIC INSTRUMENTS SECTION of next year's British Industries Fair at Olympia will occupy the areas to the left and right of the Addison Road entrance, where the Empire Section—now transferred to Earls Court—was formerly housed. Perfumery and chemists' supplies will be transferred from the first floor of the Empire Hall at Olympia to the ground floor of the Grand Hall.

W. H. BRAMALL AND CO., LTD., manufacturers of valve, pressure vacuum and recording gauges, etc., of Manchester, report that they have opened a London office at 111 Gray's Inn Road, W.C.1, under the charge of Mr. A. R. Napier. They have taken over the manufacture of "Rose" indicators, and these are being made at the company's Manchester works, under the supervision of the inventor, Mr. Rose.

THE GERMAN PRICE COMMISSIONER, Herr Adolf Wagner, has announced that in agreement with the industries affected he has ordered reductions ranging from 5 to 10 per cent. in the prices of a large number of proprietary articles. The saving to consumers is estimated at 100,000,000 marks (about £8,000,000) a year. Among the articles are soap, powder, cosmetics and pharmaceutical preparations.

THE SUCCESS OF MODERN WELDING methods is emphasised in a booklet issued by Robert Jenkins and Co., Ltd. Their factory is now capable of an output of 750 tons per month. Most of the work illustrated is welded from mild steel, but the firm has further developed their already considerable experience in the welding of special anti-corrosion or stainless steels, Armco iron, copper-bearing steel and aluminium.

MODERNISATION OF COKE-WORKS and the erection of new batteries of ovens are taking place in South Yorkshire in consequence of the very full demand for coke and very firm prices. At the coke-works at Skinner and Holford's Waleswood colliery a new battery of coke ovens designed to carbonise about 100,000 tons of coal a year has been erected. Full production has been started this week. The plant will produce among its by-products benzole, tar, and concentrated ammonia liquor.

THE AUTOMATIC COIL WINDER AND ELECTRICAL EQUIPMENT CO., LTD., state that the following instruments were stolen from a representative's car in Islington on November 2:—Universal "Avometer" No. 66—5454, d.c. "Avometer" No. 6594, universal "Avominor" No. U. 23257—46, d.c. "Avominor" No. 41931—46, "Avo" oscillator No. 3150, "Avodapter" and "Avocoupler" (no record of serial Nos.), "Avo" exposure meter No. 14015—107, Smethurst high-light meter No. H. 1012—67, "Avo" light meter for measuring candle power No. H. 1020—37, 1—"P" type Zeva iron No. H. 16, and 1—"P.O." type Zeva iron No. G. 109. The company has a black list upon which they record the serial numbers of such instruments, most of which are sent to them for repair in due course, and upon receipt of any such stolen instruments they advise the original purchasers.

IN A CIRCULAR TO SHAREHOLDERS the directors of the Rugby Portland Cement Co. state that demand is in excess of the company's current manufacturing capacity and they have decided to double the new plant at Southam. In order to simplify the organisation of the company it has been decided to liquidate the two manufacturing subsidiary companies and to transfer their assets to the parent company. The directors feel that it is now desirable to consolidate the company's financial structure and, in addition to placing the finance of the plant extensions on a permanent basis, to provide additional working capital. Provisional steps have been taken to place privately an issue of debenture stock. Meetings are called for November 29, when shareholders will be asked to increase the company's borrowing powers to a sum equivalent to double the amount of the paid-up share capital, and to agree to alterations in the articles of association. It is also proposed to convert 400,000 of the unissued ordinary shares of 5s. each into 100,000 six per cent. cumulative preference shares of £1 each, ranking *pari passu* with the existing preference shares.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

CONDITIONING OF LEATHER.—B. B. Chemical Co., Ltd. 29165.

STABILISATION OF CHLORINATED SOLVENTS.—J. H. Bell. 29113.

PROCESS FOR COLOURING TEXTILE, ETC., MATERIALS.—G. Bingham. 29003.

ROASTING OF MATERIALS rich in sulphur.—N. S. Borch. 28788.

SEPARATION OF LIQUID MIXTURES.—British Celanese, Ltd. (United States, Oct. 31, '36.) 29104.

PRODUCTION OF POROUS MATERIALS.—British Celanese, Ltd. (United States, Oct. 27, '36.) 29357.

SPINNING OF ARTIFICIAL FIBRES from solutions.—A. Carpmael (I. G. Farbenindustrie.) 28771, 28910, 28911.

MANUFACTURE OF ALDEHYDES.—A. Carpmael (I. G. Farbenindustrie.) 28772.

MANUFACTURE OF BASIC DERIVATIVES of fatty acids.—Chemical Works, formerly Sandoz. (Switzerland, Oct. 23, '36.) 28923.

TREATMENT OF POLYMERISED ORGANIC COMPOUNDS.—Distillers Co., Ltd., H. M. Hutchinson and H. P. Staudinger. 29409, 29410.

COAGULATION OF SYNTHETIC RUBBER LATICES.—E. I. du Pont de Nemours and Co. (United States, Oct. 24, '36.) 29151.

COAGULATION OF COLLOIDAL DISPERSION.—E. I. du Pont de Nemours and Co. (United States, Oct. 24, '36.) 29152.

MANUFACTURE OF KETENES.—E. I. du Pont de Nemours and Co. (United States, Oct. 28, '36.) 29405.

SOFTENING OF TEXTILE MATERIALS.—L. S. E. Ellis (Chemical Works, formerly Sandoz). 29371.

PRODUCTION OF GLASS THREADS.—O. Gossler Glasgespinstfabric Ges. (Germany, Nov. 21, '36.) 29366.

MANUFACTURE OF THERAPEUTICALLY-ACTIVE ARSONIC ACIDS.—W. W. Groves (I. G. Farbenindustrie.) 29229.

STABILISATION OF PHYSIOLOGICAL SOLUTIONS.—W. W. Groves (I. G. Farbenindustrie.) 29230.

MANUFACTURE OF PREPARATIONS from the blood-sugar reducing hormone of the pancreas.—W. W. Groves (I. G. Farbenindustrie). 29351.

MANUFACTURE OF 2.2 : 2.3-DIBROMOSTIGMASTEROL.—W. W. Groves (I. G. Farbenindustrie.) 29352.

MANUFACTURE OF AZO-DYESTUFFS insoluble in water.—W. W. Groves (I. G. Farbenindustrie.) 29353.

FINISHING OF SPUN RAYON from regenerated cellulose.—Heberlein and Co., A.-G., and E. Weiss. 29127.

SAPONIFICATION OF FATTY ACIDS with concentrated soda lye.—Heilsberg and Co., Ges. (Germany, Oct. 24, '36.) 29068.

ALLOYS with enhanced mechanical properties at high temperatures.—Heraeus-Vacuumschmelze, A.-G., and W. Rohn. 29026.

ALUMINIUM-BASE ALLOYS.—I. G. Farbenindustrie. (Germany, Jan. 16.) 28748.

HYDROGENATION OF MONOVINYLACETYLENE.—I. G. Farbenindustrie. (Germany, Oct. 22, '36.) 28912, 28913.

IMPREGNATING, ETC., COMPOUNDS FOR CABLES.—I. G. Farbenindustrie. (Germany, Oct. 21, '36.) 28742.

FILMS, ETC., PREPARED FROM SOLUTIONS.—Imperial Chemical Industries, Ltd. 28927, 28928, 29403, 29404.

MANUFACTURE OF BENZENE HEXACHLORIDE.—Imperial Chemical Industries, Ltd. 29273.

MANUFACTURE OF ESTERS.—Imperial Chemical Industries, Ltd. 29274.

RECOVERY OF NITROGEN AND OXYGEN.—G. W. Johnson (I. G. Farbenindustrie.) 28886.

MANUFACTURE OF VAT DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) 29155.

PROCESSING OF TEXTILES.—B. Laporte, Ltd. 29228.

HARD ALLOY COMPOSITIONS.—Mallory Metallurgical Products, Ltd. (Mallory and Co.). 29167.

COPPER-BASE ALLOYS.—Mallory Metallurgical Products, Ltd. (Mallory and Co.). 29168, 29169.

MANUFACTURE OF FIBRES FROM GLASS, ETC.—Naamlooze Vennootschap Maatschappij tot Beheer en Exploitatie van Octrooien. (United States, Oct. 23, '36.) 28741.

MANUFACTURE OF IRON OXIDE.—National Processes, Ltd., and S. Robson. 29033.

CONCENTRATION OF NON-METALLIC MINERALS.—Phosphate Recovery Corporation. (United States, July 28.) 29356.

TREATMENT OF METAL SURFACES.—Pyreno Co., Ltd. (Parker Rust Proof Co.). 29146.

PURIFICATION OF BARYTES, ETC.—P. J. B. Reynolds, W. H. Reynolds, and E. A. Wilkins. 29038.

RECOVERY OF ALUMINIUM, ETC., COMPOUNDS.—Rütgerswerke, A.-G. (Germany, Nov. 17, '36.) 28768.

SYNTHETIC RUBBER, ETC.—G. E. Scharff, and Imperial Chemical Industries, Ltd. 29272.

MANUFACTURE OF DECOLORISING, ETC., AGENTS.—R. W. Schmidt. 29279.

MANUFACTURE OF ANHYDROUS BERYLLIUM FLUORIDE free from oxide.—Seri Holding Soc. Anon. (Italy, April 17.) 29349.

MANUFACTURE OF CONDENSATION PRODUCTS CONTAINING NITROGEN. Soc. of Chemical Industry in Basle. (Switzerland, Oct. 24, '36.) 29106. (Switzerland, Dec. 22, '36.) 29107. (Switzerland, Jan. 14.) 29108.

PLASTICIZED SYNTHETIC RUBBER COMPOSITIONS.—Standard Oil Development Co. (United States, Dec. 18, '36.) 28782.

BLENDING AGENTS FOR LUBRICATING OILS.—Standard Oil Development Co. (United States, Dec. 24, '36.) 29105.

MANUFACTURE OF RUBBER-LIKE PRODUCTS.—Standard Oil Development Co. (United States, Dec. 11, '36.) 29219.

PROCESS FOR RETAINING CALCIUM-SALTS in solution.—F. D. Timmermans. (Germany, Oct. 23, '36.) 28711.

TREATMENT OF QUICKLIME.—Batigne de Fierhard, and Baroness A. P. Gabrielle. 29638.

Specifications Open to Public Inspection

MANUFACTURE OF DI-(γ-CHLORO-α- OR β-OXYPROPYL)-ARYLAMINES. I. G. Farbenindustrie. April 18, 1936. 6597/37.

PROCESS FOR TREATING ETHEREAL OILS with the aid of extracting agents.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 17, 1936. 9328/37.

PROCESS FOR THE DESULPHURISATION OF HYDROCARBONS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 13, 1936. 9924/37.

STEROL DERIVATIVES and process of forming same.—Parke, Davis and Co. April 13, 1936. 10507/37.

PROCESS FOR STEROL SYNTHESIS.—Parke, Davis and Co. April 13, 1936. 10508/37.

PROCESS FOR APPLYING A COATING OF LACQUER to flexible materials.—Naamlooze Vennootschap Vereenigd Industrieel Bezit Veritex N.V. April 17, 1936. 10533/37.

PROCESS FOR THE REACTIVATION OF SPENT CLAY.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 15, 1936. 10647/37.

METHOD OF PULVERISING MELTED PRODUCTS by atomisation.—Niro Atomiser, A.-G. April 14, 1936. 10649/37.

TREATING OF HIDES AND SKINS.—Tanning Process Co. April 16, 1936. 10676/37.

PROCESS FOR THE MANUFACTURE OF PIG-IRON in the blast furnace from a burden rich in silica or sulphur.—M. Paschke, and E. Peetz. April 15, 1936. 10796/37.

MANUFACTURE OF DIARYL ARYLENE DIAMINES.—United States Rubber Products, Inc. April 18, 1936. 10894/37.

MANUFACTURE OF WHITE PIGMENTS.—I. G. Farbenindustrie. April 17, 1936. 10940/37.

DISTILLATION PROCESS.—Eastman Kodak Co. April 18, 1936. 11064/37.

PROCESS FOR THE MANUFACTURE OF TITANIUM PIGMENTS.—I. G. Farbenindustrie. April 17, 1936. 11149/37.

PROCESS FOR THE PRODUCTION OF CONDENSATION PRODUCTS FROM FORMALDEHYDE AND UREA.—Bakelite Ges. April 28, 1936. (Cognate Application, 8056/37.) 8055/37.

CALBURISING OF IRON, STEEL, AND ALLOY STEELS.—Rodman Chemical Co. May 1, 1936. 9047/37.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS OF HIGH MOLECULAR WEIGHT.—Soc. of Chemical Industry in Basle. April 29, 1936. 11266/37.

PROCESS FOR THE PRODUCTION IN A PURE STATE OF EASILY POLYMERISABLE ORGANIC COMPOUNDS.—Rohm and Haas, A.-G. April 29, 1936. 11911/37.

THERMOPLASTIC RUBBER DERIVATIVES.—H. D. Minich. April 30, 1936. 11922/37.

MANUFACTURE OF SYNTHETIC RESINS.—Du Pont de Nemours and Co. April 28, 1936. 12167/37.

PRODUCTION OF UREA-ALDEHYDE SYNTHETIC RESINS.—Du Pont de Nemours and Co. May 1, 1936. 12432/37.

Specifications Accepted with Date of Application

MANUFACTURE AND PRODUCTION OF ESTERS of high molecular weight.—G. W. Johnson (I. G. Farbenindustrie.) March 12, 1936. 473,424.

WET TREATMENT OF FIBROUS MATERIALS.—I. G. Farbenindustrie. April 10, 1935. 473,549.

PRODUCTION OF POLAR ADSORBENTS.—E. B. Higgins. April 14, 1936. 473,647.

MANUFACTURE OF STABLE, WATER-CONTAINING, PASTY, CREAMY, OR LIQUID EMULSIONS.—Deutsche Hydrierwerke, A.-G. April 13, 1935. 473,550.

MANUFACTURE OF POLISHES, shoe creams, and other surface preserving or dressing agents.—Deutsche Hydrierwerke, A.-G. April 12, 1935. 473,551.

METHODS AND AGENTS FOR REMOVING ENAMEL from enamelled articles.—I. G. Farbenindustrie. April 13, 1935. 473,556.

PROCESS FOR THE MANUFACTURE OF READILY SOLUBLE SALTS of 9-amino-acridine compounds.—I. G. Farbenindustrie. April 13, 1935. 473,555.

PROCESS OF TREATING CARBON CARBONACEOUS MATERIAL such as coal and the like and organic carbon compounds.—Gewerkschaft Auguste. April 26, 1935. 473,651.

MANUFACTURE OF PLASTIC MASSES derived from polyvinyl chlorides.—I. G. Farbenindustrie. May 25, 1935. 473,616.

MANUFACTURE AND PRODUCTION OF CARBON COMPOUNDS of high molecular weight.—G. W. Johnson (I. G. Farbenindustrie.) April 15, 1936. 473,653.

COATING OF ABSORBENT MATERIALS.—G. C. Tyce, Imperial Chemical Industries, Ltd., and V. Liefebure. April 15, 1936. 473,657.

MANUFACTURE OF ARYLIDES OF HYDROXY-ORTHO-CARBOXY-BENZOACRIDONES and of azo dyestuffs therefrom.—W. W. Groves (I. G. Farbenindustrie). April 16, 1936. 473,615.

PROCESS FOR THE MANUFACTURE OF WATER-SOLUBLE DERIVATIVES of cyclopentano-perhydrophenanthrenes.—A. Carpmael (I. G. Farbenindustrie.) April 18, 1936. 473,629.

PROCESS FOR MANUFACTURING RESINS derived from phenols or the like and aldehydes.—I. Kreidl. May 15, 1935. 473,439.

SEPARATION OF TERTIARY OLEFINES from gas mixtures.—G. W. Johnson (I. G. Farbenindustrie.) July 27, 1936. 473,501.

PRODUCTION OF HARD CARBIDES, especially titanium carbide, free from graphite.—I. G. Farbenindustrie. Feb. 11, 1936. 473,510.

PROCESS AND APPARATUS FOR DEPOISONING GASES.—F. Bossner, and C. Marischka. Nov. 4, 1935. 473,575.

LEAD ALLOYS.—Goodlass Wall and Lead Industries, Ltd., and W. T. Butcher. Aug. 8, 1936. 473,642.

METHOD OF REDUCING OR ELIMINATING FOAM FORMATION in the process of making paper.—R. M. Hughes (Pattilloch Processes, Inc.). Dec. 10, 1936. 473,643.

POLYMERISATION OF TRICHLORETHYLENE.—Consortium Fur Elektrochemische Industrie Ges. Jan. 6, 1936. 473,644.

MANUFACTURE OF CHROMIUM OXIDES and products comprising the same.—W. Hene. Jan. 7, 1937. 473,454.

ALKALI-ALKALINE EARTH FERTILISER and process of producing same.—Metallges, A.-G. Jan. 24, 1936. 473,520.

PROCESSES FOR REFINING LUBRICATING-OILS.—J. Pintsch, A.-G. March 3, 1936. 473,458.

MANUFACTURE OF 1-CHLOROMETHYL-5-NITRONAPHTHALENE.—I. G. Farbenindustrie. April 3, 1936. 473,522.

MANUFACTURE OF COMPOUNDS OF DIMETHYLXANTHINES.—I. Grossberg. March 30, 1936. 473,523.

MANUFACTURE OF DIAZO DYESTUFFS.—J. R. Geigy, A.-G. April 29, 1936. 473,525.

HYDROLYSIS OF TITANIUM SALT SOLUTIONS.—British Titan Products Co., Ltd. April 4, 1936 473,470.

CHEMICAL HEATING COMPOSITIONS AND HEATING-PADS.—W. F. Sklenar, and M. H. Ballantyne. January 29, 1936. 474,249.

PRODUCTION OF IODO-SUBSTITUTED SALICYCLIC ACIDS.—E. Viel. (February 15, 1935.) 474,153.

FROTH-FLOTATION TREATMENT OF SYLVINITE ORES.—F. R. Tate (Potash Co. of America.) February 20, 1936. 474,228.

PROCESS FOR MANUFACTURING CLEANSING, wetting out, foaming, dispersing, equalising, and bleaching agents, and treatment baths for the textile leather, and similar industries.—Naamlooze Vennootschap Chemische Fabriek Servo, and M. D. Rozenbroek. (February 27, 1935.) 474,229.

MANUFACTURE AND APPLICATION OF VALUABLE OILS FROM VINYL-ACETYLENE.—W. W. Groves (I. G. Farbenindustrie, A.-G.) April 24, 1936. (Cognate Application, 11725/36.) 474,234.

MANUFACTURE OF A PHENOL DERIVATIVE and its use for the preparation of mineral-oil compositions.—Socony-Vacuum Oil Co., Inc. (November 27, 1935.) 474,240.

MANUFACTURE OF CARBONATES, hydroxides, and fluorides of the alkali metals.—Consolidirte Alkaliwerke. (April 27, 1935.) (Cognate Applications, 11980/36, 11981/36, 11982/36, and 11983/36.) 474,159.

MANUFACTURE OF SHAPED ARTICLES FROM POLYMERISABLE ORGANIC LIQUIDS.—P. H. Hull, and Imperial Chemical Industries, Ltd. April 27, 1936. 474,242.

PROCESS FOR THE MANUFACTURE OF SULPHONIC ACID AMIDE COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie, A.-G.) April 28, 1936. 474,423.

MANUFACTURE OF FILMS, coating, tapes, ribbons, and the like of polymerised ethylene.—M. W. Perrin, J. G. Paton, E. G. Williams, and Imperial Chemical Industries, Ltd. April 29, 1936. (Cognate Application, 24372/36.) 474,426.

MANUFACTURE OF TEXTILE MATERIALS, foils, and the like containing organic derivatives of cellulose.—H. Dreyfus. April 29, 1936. 474,390.

PROCESSES FOR RENDERING TEXTILES WATER-REPELLENT, and products therefrom.—Farberei-Akt.-Ges. Vorm. E. Stolte Nachfolger and W. Missy. (May 2, 1935.) (Cognate Applications, 12448/36, 12449/36, 12450/36, and 12451/36.) 474,403.

MANUFACTURE OF CELLULOSE FROM LIGNOCELLULOSE MATERIALS.—H. Dreyfus. May 5, 1936. 474,305.

MANUFACTURE AND PRODUCTION OF COARSELY CRYSTALLISED AMMONIUM BICARBONATE.—G. W. Johnson (I. G. Farbenindustrie, A.-G.) May 14, 1936. 474,164.

PROCESS AND APPARATUS FOR THE MANUFACTURE OF OXIDES OR SUB-OXIDES OF LEAD.—J. Aitken. July 13, 1936. 474,267.

LEAD ALLOYS.—Goodlass Wall and Lead Industries, Ltd., and W. T. Butcher. August 8, 1936. (Cognate Application, 7163/37.) 474,410.

PRODUCTION OF AMMONIUM NITRATE and mixtures containing the same, and apparatus therefor.—De Directie Van de Staats-Mijnen in Limberg. (November 18, 1935.) 474,181.

PROCESS FOR THE ELECTROLYTIC MANUFACTURE OF OXIDE LAYERS on aluminium and aluminium alloys.—Schering-Kahlbaum, A.-G. (December 11, 1935.) (Cognate Application, 33849/36.) 474,323.

SEPARATION OF ETHYLENE FROM HIGHER OLEFINES.—W. J. Tennant (Dow Chemical Co.) December 22, 1936. 474,414.

Chemical and Allied Stocks and Shares

APART from British Government securities, all sections of the Stock Exchange have been reactionary this week. Sentiment has been influenced almost entirely by the further indications of a trade reaction in the United States and by the decline in prices of metals and commodities, which is attributed largely to the less active conditions in America. Shares of chemical and allied companies are lower on balance for the week, but this has to be read in relation to the general trend of markets which has affected all actively-dealt-in industrial securities.

Boots Pure Drug were subsequently a steady feature, but as compared with a week ago the price has gone back from 49s. 6d. to 48s. at the time of writing. Imperial Chemical continued to fluctuate, but at 36s. 1½d. show a loss of only 6d. on balance, there being general confidence that the dividend is likely to be at least maintained at 8 per cent., Borax Consolidated have reacted from 29s. to 28s. 6d., the market now being less hopeful of a larger dividend as the company has important assets in America and its earnings might be affected if the trade recession in the U.S.A. were to continue. Imperial Smelting have declined further to 13s. owing to the lower price of zinc, as the assumption in the market is that the company's profits are influenced mainly by the price of this metal.

Associated Portland Cement show a decline of 2s. 6d. to 87s. 6d. at the time of writing, and British Plaster Board are 1s. down at 31s. despite continued market expectations that the interim payment is likely to be maintained. Timothy Whites and Taylors were lower at 30s. 6d., although the interim payment created a favourable impression and has aroused hopes that the total distribution will be brought up to at least 35 per cent. for the current accounting period, which will cover fifteen months. Goodlass Wall at 12s. 6d. were little changed in price. In 1936 the steady increase in profits and dividend was continued, net profits being £195,487, compared with £184,108 in the previous year. Over 11 per cent. was earned on the 10s. ordinary shares, the dividends on which was increased 1 per cent. to 7 per cent.

Fison, Packard and Prentice are 35s. 3d., compared with 36s. 3d. a week ago, and would appear to offer an unduly generous yield on the basis of their 9 per cent. dividend. Cooper McDougall and Robertson were around 34s., but the amount of business was probably not sufficient to influence the price. Monsanto Chemicals 5½ per cent. preference were little changed at 22s. 6d. The 10s. ordinary shares of Leeds Fireclay were more active around 6s. 6d. on the resumption of dividends. General Refractories 10s. shares were lowered to 24s. 6d. at which a rather large yield is given as last year's dividend was 16 per cent. The interim dividend for the current year has been raised to 8 per cent., and it may be recalled that in making the announcement the directors referred to the company's progress.

Turner and Newall lost several shillings to 83s. 9d. sentiment being affected by the doubts expressed in the market as to whether the forthcoming results will show an increase in the dividend, the assumption being that, although profits may have recorded a further advance, the directors may decide to follow a very conservative policy. Pinchin Johnson have lost a few pence to 40s. 6d., and most other paint shares were fairly steady, including Lewis Berger, which were influenced by the good impression created by the past year's results. Although the dividend is being maintained at 16 per cent., earnings on the ordinary shares work out at over 27 per cent.

Unilever are 35s. 9d. at the time of writing, having declined sharply in common with most shares with an international market. International Nickel also reacted in price. British Match were a good feature, having improved from 35s. to 36s. 9d. at the time of writing. British Industrial Plastics 2s. shares were fairly steady at 2s. 9d. as were British Drug Houses at 23s. 6d. British Glues 4s. units were lower at 6s. 3d., but the price was probably not tested by much business.

Richard Thomas failed to benefit from the maintenance of the interim dividend on the enlarged capital. Dorman Long were weak as there is a disposition in the market to revise estimates of the impending dividend. Oil shares declined heavily owing to talk of a possible decrease in the price of petrol.

Weekly Prices of British Chemical Products

THE chemical markets on the whole display a cheerful tone and values with few exceptions are maintained at recent levels. The demand for general chemicals continues to follow a normal course with buyers calling up the balance of their contract commitments. A certain amount of activity is already in progress for placing 1938 requirements. Following the further decline in metal prices quotations for lead oxides have been reduced by £2 per ton and values for di- and tri-sodium phosphates are reported firmer. Elsewhere in this market and in wood distillation products and rubber chemicals prices are unchanged. In the coal tar section cresylic acid is easier on a little less demand, and naphthalene is being offered at a little below recent quotations. Carbolic acid is firm, but quotations remain unchanged; crystals are reported in strong demand. There is a persistent demand for pyridine and quotations have again shown an upward tendency.

GLASGOW.—There has been some improvement in the demand for chemicals for home trade during the week, but extra business remains very quiet. Prices generally continue very firm with a tendency towards higher figures, especially for forward delivery, but lead and copper products exceptionally are cheaper on account of the further fall in metal prices.

Price Changes

Rises: Pyridine, 99/140%, 90/160%; Sodium Metasilicate.
Falls: Copper Sulphate (Manchester and Glasgow); Lead Acetate (Manchester); Lead, red; Cresylic Acid, 97-99%; Naphthalene, crude, whizzed or hot pressed; Lead Acetate (Glasgow).

General Chemicals

ACETONE.—£45 to £47 per ton.

ACETIC ACID.—Tech., 80%, £28 5s. per ton; pure 80%, £30 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 per ton d/d Lancs.; GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £17 10s. per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £17 per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £8 15s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d. station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—9¼d. per lb., less 2½%; d/d U.K.

CITRIC ACID.—1s. 0½d. per lb. MANCHESTER: 1s. SCOTLAND: B.P. crystals, 1s. 0½d. per lb., less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £19 per ton f.o.b. SCOTLAND: £21 per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£22 10s. per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £5 7s. 6d. to £6 7s. 6d. per cwt. according to quantity; in drums, £5 to £5 13s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. to 7s. 6d. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots) Dark, 50% by volume, £23 10s.; by weight, £27 10s.; Pale, 50% by volume, £27; by weight, £32 per ton. LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £32 10s.; brown, £1 per ton less. MANCHESTER: White, £35; brown, £34.

LEAD NITRATE.—£34 per ton for 1-ton lots.

LEAD, RED.—£31 15s. per ton, less 2½% carriage paid. SCOTLAND: £32 per ton, less 2½%, carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £33 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 10s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 11d per lb.; powder B.P., 6s 1d.; bichloride B.P. (corros. sub.) 5s. 2d.; powder B.P. 4s. 10d.; chloride B.P. (calomel), 5s. 11d.; red oxide cryst. (red precip.), 7s.; levig. 6s. 6d.; yellow oxide B.P. 6s. 4d.; persulphate white B.P.C., 6s. 1d.; sulphide black (hyd. sulph. cum sulph. 50%), 6s. For quantities under 112 lb., 1d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—80° Tw. spot, £16 10s. per ton makers' works.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £36 15s. per ton for 2-ton lots ex store; broken, £42 per ton. MANCHESTER: £39.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £38 per ton.

POTASSIUM DICHROMATE.—SCOTLAND: 5d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 1s.

POTASSIUM PRUSSIATE.—6½d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d.

SALAMMONIAC.—Dog-tooth crystals, £36 per ton, fine white crystals, £16 10s. per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 to £3 10s. per ton.

SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £12 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks. Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£18 per ton carriage paid North. GLASGOW: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE MONOHYDRATE.—£15 5s. per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£26 10s. to £30 per ton. GLASGOW: £1 10s. per cwt., minimum 3 cwt. lots.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM DICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. MANCHESTER: 4d. per lb. GLASGOW: 4d., net, carriage paid.

SODIUM HYPOSULPHITE.—Pea crystals, £14 10s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.

SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.
SODIUM PRUSSIATE.—d. per lb. for ton lots. GLASGOW: 5d. to 5¾d. ex store. MANCHESTER: 4d. to 4¾d.
SODIUM SILICATE.—£9 10s. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 5s. per ton d/d in drums; crystals 30/32%, £8 15s. per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.
SODIUM SULPHITE.—Pea crystals, spot, £13 10s. per ton d/d sta- of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. per lb.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. per lb. GLASGOW: 1s. 1d. per lb.
ZINC SULPHATE.—Tech., £12 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb., according to quality
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £6 10s. per ton, according to quality.
CADMIUM SULPHIDE.—7s. 8d. to 7s. 11d. per lb.
CARBON BLACK.—4⅜d. per lb., ex store.
CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4¾d. to 5½d. per lb.; dark 4d. to 4½d. per lb.
LAMP BLACK.—£28 to £30 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—30%, £16 10s. to £17 5s. per ton.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILLION.—Pale, or deep, 5s. 3d. per lb., 1-cwt. lots.
ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6 = nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
NITRO CHALK.—£7 10s. 6d. per ton for delivery up to June 30, 1938.
SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9¼d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d.
CARBOLIC ACID.—Crystals, 7¾d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 4s. to 4s. 3d., dehydrated, 4s. 6d. to 4s. 9d. per gal. MANCHESTER: Crystals, 9¾d. to 10d. per lb. f.o.b. in drums; crude, 4s. 3d. per gal. GLASGOW: Crude, 60's, 4s. 3d. to 4s. 6d. per gal.; distilled, 60's.
CREOSOTE.—Home trade, 6¼d. to 6¾d. per gal., f.o.r. makers' works; exports, 6⅜d. to 6⅝d. per gal., according to grade. MANCHESTER: 5¼d. to 6¼d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils, 5⅝d. to 6¼d.
CRESYLIC ACID.—97/99%, 4s. 4d. to 4s. 7d.; 99/100%, 5s. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 4s. 9d.; Dark, 95%, 4s. to 4s. 3d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 4s. 3d. to 4s. 6d. MANCHESTER: Pale, 99/100%, 4s. 6d.
NAPHTHA.—Solvent, 90/160, 1s. 6½d. to 1s. 7½d. per gal.; solvent, 95/160%, 1s. 8d. to 1s. 9d., naked at works; heavy 90/190%, 1s. 1½d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7½d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.
NAPHTHALENE.—Crude, whizzed or hot pressed, £8 to £9 per ton; purified crystals, £18 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 10s. to £7 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £19 per ton f.o.b.
PITCH.—Medium, soft, 38s. per ton, f.o.b. MANCHESTER: 36s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
PYRIDINE.—90/140%, 14s. to 14s. 6d. per gal.; 90/160%, 12s. to 12s. 6d. per gal.; 90/180%, 3s. 6d. to 4s. per gal., f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 12s. 6d. to 13s. 6d. per gal.
TOLUOL.—90%, 1s. 11d. per gal.; pure, 2s. 5d. GLASGOW: 90%, 120, 1s. 10d. to 2s. per gal.
XYLOL.—Commercial, 2s. 3d. per gal.; pure, 2s. 5d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £8 to £8 10s. per ton; grey, £10 10s. to £11 10s. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.
METHYL ACETONE.—40-50%, £42 to £45 per ton.
WOOD CREOSOTE.—Unrefined 6d. to 9d. per gal., according to boiling range.
WOOD, NAPHTHA, MISCIBLE.—2s. 8d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
WOOD TAR.—£3 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE, SOLID.—£72 per ton.
DINITROTOLUENE.—48/50° C., 8½d. per lb.; 66/68° C., 10d.
DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works
GAMMA ACID.—Spot, 4s. per lb. 100% d/d buyer's works.
H ACID.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.
NAPHTHIONIC ACID.—1s. 8d. per lb.
α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.
β-NAPHTHOL.—9½d. to 9⅝d. per lb.; flake, 9½d. to 9⅝d.
α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d. in casks.
β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. per lb. 100%.
o-NITRANILINE.—3s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 7d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. to 2s. 1d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—9½d. to 10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 9d. per lb., 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—10½d. per lb., in 8/10-cwt. drums, drums extra.
p-TOLUIDINE.—1s. 10½d. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 3d. per lb., 100%.

Latest Oil Prices

LONDON, Nov. 10.—LINSEED OIL was steady. Spot, £29 5s. per ton (small quantities), Nov. and Dec., £26 17s. 6d.; Jan. to Dec. (1938), £27, naked. SOYA BEAN OIL was steady. Oriental, spot, ex tank Rotterdam, £20 7s. 6d. per ton. RAPE OIL was inactive. Crude extracted, £36 10s. per ton; technical refined, £37 10s., naked, ex wharf. COTTON OIL was easy. Egyptian crude, £21 per ton; refined common edible, £24; deodorised, £26, naked, ex mill (small lots £1 10s. extra). TURPENTINE was lower. American, spot, 31s. per cwt.; Nov.-Dec. delivery, 31s. 3d.; Jan.-April, 32s. 3d.
HULL.—LINSEED OIL.—Spot quoted £28 2s. 6d. per ton; Nov., £27 12s. 6d.; Dec., £27 10s.; Jan.-April and May-Aug., £27. COTTON OIL.—Egyptian, crude, spot, £19 10s. per ton; edible, refined, spot, £22 10s.; technical, spot, £22 10s.; deodorised, £24 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £21 10s. per ton, naked. GROUNDNUT OIL.—Extracted, spot, £29 10s. per ton; deodorised, £32 10s. RAPE OIL.—Extracted, spot, £35 10s. per ton; refined, £36 10s. SOYA OIL.—Extracted, spot, £27 10s. per ton; deodorised, £30 10s.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

COLOQUID CELLULOSE, LTD., London, E.C. (M., 13/11/37.) Oct. 27, £4,000 debentures, to W. Jacobs, London; general charge.

CROYDON PLASTICS, LTD. (M., 13/11/37.) Nov. 2, series of £3,500 debentures, present issue £1,000; general charge.

Satisfactions

ANGLO-AMERICAN CHEMICAL CO., LTD., London, S.W. (M.S., 13/11/37.) Satisfaction Nov. 1, of debentures registered Apr. 13, 1933.

PLANET GYPSUM BOARD CO., LTD., Slough. (M.S., 13/11/37. Satisfaction Nov. 1, of debentures registered Mar. 10, 1937, to extent of £1,750.

Company Winding-Up Voluntarily

THE CHESHIRE SOAP CO., LTD., Manchester. (C.W.U.V., 13/11/37. By special resolution, Nov. 1, 1937. William Roskell Charnley, of 22 Tib Lane, Cross Street, Manchester, appointed liquidator.

Forthcoming Events

Birmingham.

November 15.—Chemical Society, at the Chemistry Lecture Theatre of the University, Edgbaston, at 5 p.m. Professor J. M. Gulland, "Nucleic Acids."

Leeds.

November 15.—Institute of Chemistry, at the University. Major-General C. H. Foulkes, "Chemical Warfare and the Civil Population." Annual general meeting.

Hull.

November 16.—Hull Chemical and Engineering Society at the Lecture Room, Municipal Technical College, Park Street, at 7.45 p.m. R. E. W. Butt, "Air Conditioning."

Huddersfield.

November 17.—Institute of Chemistry (Huddersfield Section). Dr. J. B. Speakman, "Recent Advances in the Chemistry of Wool and Wool Textile Processes."

London.

November 17.—Electrodepositors' Technical Society, at the Northampton Polytechnic Institute, St. John Street, E.C.1, at 8.15 p.m. Annual meeting and presidential address.

Institute of Chemistry, at 30 Russell Square, W.C.1. Ninth Gluckstein memorial lecture. Mr. W. A. S. Calder, "Chemist's Progress."

Institution of Civil Engineers, at Great George Street, S.W.1, at 6.15 p.m. A. R. Collins and Sir. E. O. Williams, "The Workability of Concrete." Students' meeting.

November 18.—Chemical Society, at Burlington House, Piccadilly, W.1, at 8 p.m. Dr. J. M. Robertson, "Bond Character and Interatomic Distance."

Institute of Vitreous Enamellers, at Charing Cross Hotel, Strand, W.C.2, at 8 p.m. H. Cowan, "Analysis of Cast Iron suitable for Vitreous Enamelling."

Annual Chemical Dinner at the Wharncliffe Rooms, Great Central Hotel, Marylebone, N.W.1, at 7 for 7.30 p.m.

November 18 and 19.—Society of Chemical Industry (Chemical Engineering Group), at King's College, Strand, W.C.2. Conference on Jointing and Packing.

November 19.—Institute of Chemistry, at 30 Russell Square, W.C.1, at 8 p.m. Special general meeting to consider the proposed petition for a Supplemental Charter.

Royal Institution of Great Britain, at 21 Albemarle Street, W.1, at 9 p.m. Sir William Bragg, "Clay."

November 24.—Institute of Chemistry (London and South-Eastern Counties Section), at Palace Hotel, Bloomsbury Street, W.C. Annual general meeting and smoking concert.

Liverpool.

November 17.—British Association of Chemists at the University, at 7.30 p.m. H. E. Potts, "Patents."

Manchester.

November 17.—British Association of Chemists, at the Engineers' Club, Albert Square. Col. Garforth, "Air Raid Precautions."

Bristol.

November 18.—Institute of Chemistry (Bristol and South-Western Counties Section), in the Chemical Department of the University, Woodland Road, at 5.30 p.m. Dr. H. E. Cox, "Some recent Developments in the Chemistry of Food."

Glasgow.

November 19.—Institute of Chemistry (Glasgow and West of Scotland Section), at Royal Technical College, 7.30 p.m. Dr. C. P. Stewart, "Some Recent Developments in Bio-chemistry."

Company News

Reckitt and Sons, manufacturers of starch, metal polishes, etc., have declared the usual quarterly interim of 1s. per share on the 3,648,000 ordinary shares of £1. Last year there was a final of 1s. 3d., and a bonus of 3d. per share, making 22½ per cent. for the year. In addition to the ordinary shares, the company has in issue 500,000 4½ per cent. cumulative first preference and 909,695 5 per cent. cumulative second preference shares of £1.

The Rubber Regenerating Co. announces substantially improved results for the twelve months to end-September, 1937. Profits have risen from £9,577 to £52,781, and the directors have written off £13,106 special depreciation on machinery made obsolete as a result of the new reclaiming process. The final dividend, as already intimated, is 10 per cent., making 15 per cent., less tax, against nil, leaving the carry-forward £6,675 higher at £20,325.

The International Nickel Co., of Canada, Ltd., in their interim financial statement for the nine months ended September 30, 1937, show a net profit of $13,030,028, equivalent to 86 cents per shares on the common stock after allowing for preferred dividend. This compares with a net profit of $14,199,394 for the previous quarter, which was equal to 94 cents per share on the common. Net profit for the first nine months of 1937 was $38,944,380, as compared with $27,029,079 for the similar period in 1936, or $2.57 per share as against $1.75 a year ago.

Brown Bayley's Steel Works, Ltd., have resumed the payment of dividends on the ordinary shares with a distribution of 10 per cent., tax free, for the year ended July 31 last. The last ordinary dividend was 7½ per cent. actual, for twenty months to July 31, 1921. In March, this year, the company paid the dividend for 1935-36 on the 5 per cent. preference shares, and at the beginning of last month payments on these shares were brought up to date. Authorised and issued capital is £800,000 in £500,000 5 per cent., tax free, cumulative preference shares and £300,000 ordinary shares.

British Celanese, Ltd., in their trading account for the year shows a balance of £2,195,760, being a decrease of £110,347, as compared with the previous year. General sales and administrative expenses, royalties, excise duty, etc., at £1,073,610 shows an increase of £17,159, as compared with the previous year. The amount charged in respect of excise duty is substantially greater, owing to the increased weight of artificial silk sold. Research and advertising, together with depreciation, accounts for an increased charge of £89,358, which, together with sundry other items, leaves the balance for the year of £269,078, as compared with £470,508, for the previous year. Income-tax and N.D.C. requirements, however, required only £22,000, as compared with £106,000, so that the resulting tax free profit is £247,078, as compared with £364,508, a decrease of £117,430.

Books Received

Asbestos. By G. E. Howling. 2nd edition. London: Imperial Institute. Pp. 88. 2s.

B.D.H. Reagents for "Spot" Tests. 6th edition. London: British Drug Houses, Ltd. 2s. 6d.

Very Low Temperatures. By T. C. Crawhall and O. Kantowicz. Book Two. Pp. 59. London: H.M. Stationery Office. 2s.

Ebulliometry: The Physical Chemistry of Distillation. By Wojciech Swietoslawski. Pp. 204. London: E. and F. N. Spon, Ltd. 15s.

Catalytic Processes in Applied Chemistry. By T. P. Hilditch and C. C. Hall. Second Edition. Pp. 478. London: Chapman and Hall. 25s.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—An important and well-established firm of manufacturers agents at Sydney wish to obtain the agencies of United Kingdom manufacturers of materials for paint, enamel, printing ink and rubber industries, preferably on a commission basis, for the whole of Australia. (Ref. No. 310.)

British India.—The Director of Contracts, Army Headquarters, Simla, invites tenders for 24,640 lbs. antimony in ingots, "star" quality. Forms of tender obtainable from the Director-General, India Store Department, Belvedere Road, Lambeth, London, S.E.1, at a fee of 5s. Tenders must be cabled direct to The Director of Contracts, Army Headquarters, Simla, to reach him not later than November 23, 1937.